

SUPPLEMENT.

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

[The MINING JOURNAL is Registered at the General Post Office as a Newspaper, and for Transmission Abroad.]

No. 2528.—VOL. LIV.

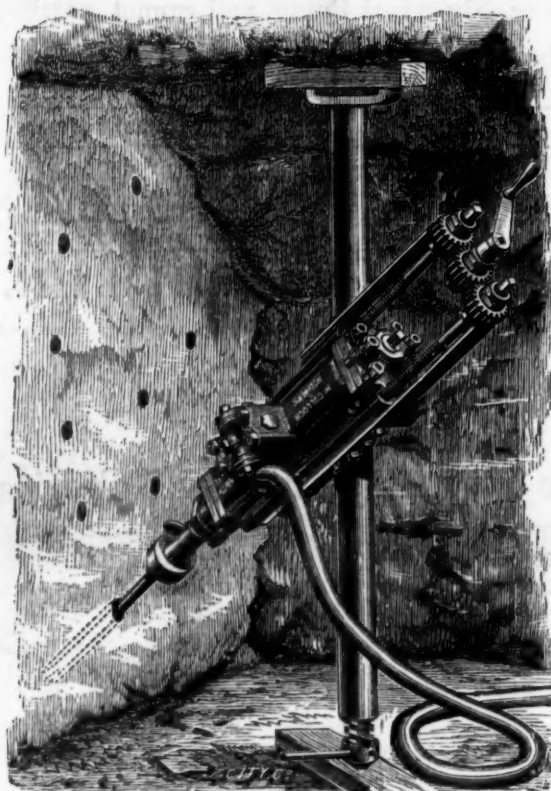
LONDON, SATURDAY, FEBRUARY 2, 1884.

PRICE (WITH THE JOURNAL) SIXPENCE
BY POST £1 4s. PER ANNUM.

FIRST SILVER MEDAL, ROYAL CORNWALL POLYTECHNIC
—Highest Award for Effectiveness in Boring, and Economy in
the Consumption of Air

JUBILEE EXHIBITION, 1882.

THE PATENT
"CORNISH" ROCK DRILL.



This Drill has been constructed after a long practical experience in the requirements necessary for Mines, and has more than realised the expectations of its inventors. The chief objects in view were GREATER DURABILITY AND LESS LIABILITY TO DIS-ARRANGEMENT; but it has also proved itself more EFFECTIVE AND ECONOMICAL.

We are now prepared to enter into any reasonable arrangement so as to enable users to judge of its merits, as we are thoroughly convinced that we can offer the BEST ROCK DRILL IN THE MARKET.

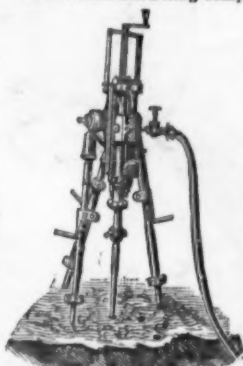
Further particulars on application to the Makers—

HOLMAN BROTHERS,
CAMBORNE FOUNDRY AND ENGINE WORKS,
CAMBORNE, CORNWALL.

THE PATENT
"ECLIPSE" ROCK-DRILL
AND
"RELIANCE" AIR-COMPRESSOR.

First Silver Medal awarded at Boring Competition, East Pool Mine, Sept. 1883.

SILVER MEDAL—PARIS, 1878—
HIGHEST AWARD



Are NOW SUPPLIED to the
ENGLISH, FOREIGN, and
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MINES, RAILWAYS, QUAR-
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"INGERSOLL ROCK DRILL."
MEDALS AND HIGHEST AWARDS
SEVEN YEARS IN SUCCESSION
FOUR IN ONE YEAR.

American Institute, 1872.
American Institute, 1873.
London International Exhibition, 1874.
Manchester Scientific Society, 1875.
Leeds Exhibition, 1875.
Royal Cornwall Polytechnic, 1875.
Rio de Janeiro Exhibition, 1875.
Australia Brisbane Exhibition, 1876.
Philadelphia Exhibition, 1876.
Royal Cornwall Polytechnic, 1877.
Mining Institute of Cornwall, 1877.
Paris Exhibition, 1878.

AWARDED FOR
SIMPLICITY IN CONSTRUCTION.

AUTOMATIC FEED

(Perfect success)

GREAT STEADINESS.

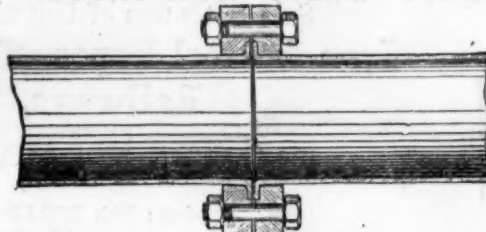
GREAT POWER.

GREAT DURABILITY.

GREAT EFFECTIVENESS.



WROUGHT-IRON STEAM TUBES.



Estimates given for Air Compressors and all kinds of Mining
Machinery. For Illustrated Catalogues, Price Lists, Testimonials,
&c., send to—

LE GROS, MAYNE, LEAVER, & CO.
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BLAKE'S LATEST IMPROVED PATENT
STONE CRUSHERS.



ALL STRAINS TAKEN BY
WROUGHT IRON OR STEEL.
DOES TWICE THE WORK OF
OLD FORM.
SECTIONAL AND EASILY
SHIPPED.

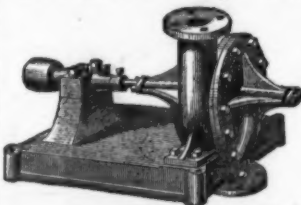
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CENTRIFUGAL PUMP

Is the only Pump from which the disc can be removed by
breaking the joint on a single face only.

Manufactured by CHARLES L. HETT,
HYDRAULIC ENGINEER,



Maker of
IMPROVED CENTRE VENT.
TURBINES
WATER WHEELS,
Horse, Steam and Wind Power
PUMPS.

Catalogues on Application.

ANCHOLME FOUNDRY, BRIGG,
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SOLID DRAWN BRASS AND COPPER
BOILER TUBES

FOR LOCOMOTIVE OR MARINE BOILERS,

MUNTZ'S OR GREEN'S PROCESS.

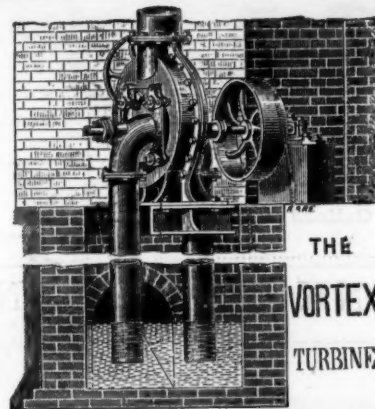
MUNTZ'S METAL COMPANY (LIMITED),
FRENCH WALLS,
NEAR BIRMINGHAM.

LONDON AGENTS—CHARLES MOSS and Co., 2, Rood Lane, London, E.C.

GILBERT GILKES & CO.,
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VORTEX
TURBINE

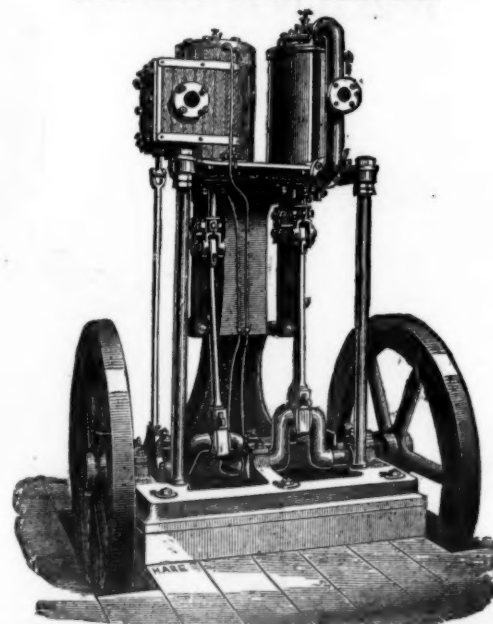
A most efficient means of applying Water Power to all kinds of
Machinery.

Largely used in DRIVING AIR COMPRESSORS, PUMPING
WORKING ORE-CRUSHING MACHINERY, and for other pur-
poses in connection with MINING.

Successfully used in ELECTRIC LIGHTING, and in utilising
DISTANT WATER POWER by means of ELECTRICITY.

A Pamphlet containing a full description of the Vortex, with se-
veral Illustrations and a number of Testimonials, can be obtained on
application.

THE
"Champion" Rock-borer
AND AIR COMPRESSOR.



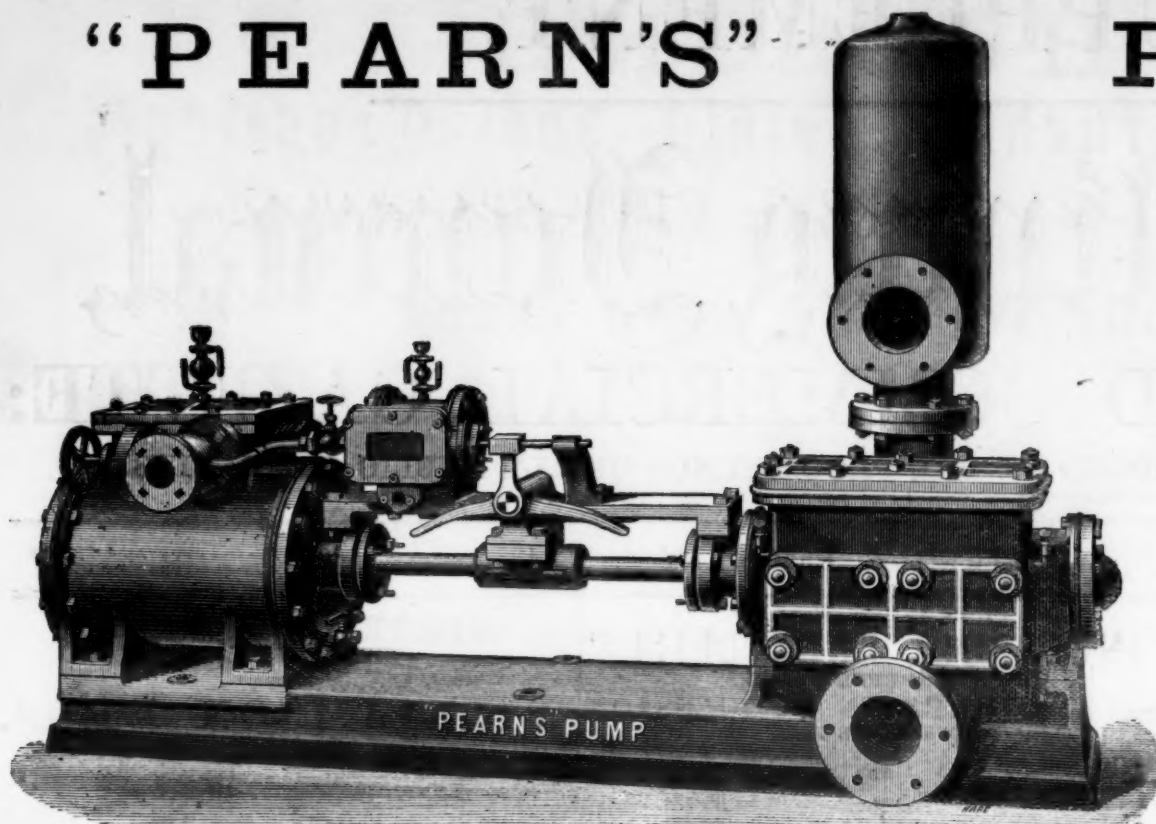
As an instance of the actual work done by this Machinery
in various kinds of ground, some of it the hardest rock, it
may be mentioned that in Cornwall, irrespective of the work
performed by the "Champion" Rock-borers and Air-compres-
sors purchased by various Mines, the drivage, rising, sinking,
and stoping done by contract by the Proprietor with his own
Machinery now amounts to over 1150 fathoms.

Several of these Air-compressors, ranging from 3½ to 12 tons
in weight may be seen in constant work in the Camborne
Mining District.

R. H. HARRIS,
ENGINEER,

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ASSAYER AND ANALYTICAL CHEMIST,
SWANSEA,
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PEARN'S combination of the SLIDE VALVE and PORTS in the AUXILIARY CYLINDER is the Simplest and most PERFECT CUSHION

SIMPLICITY

AND

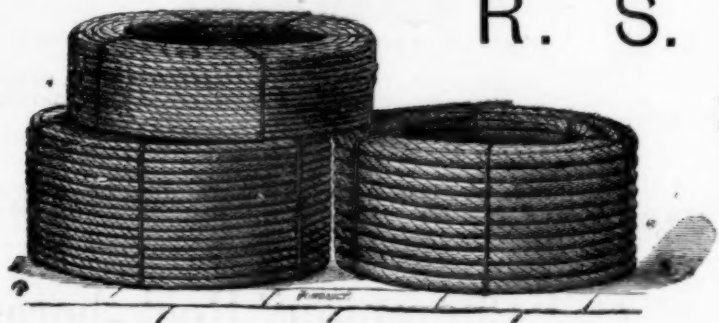
DURABILITY.

IT HAS NO INTRICATE PARTS, the WORKING PARTS are the same as used in the ordinary STEAM ENGINE.

It is as Simple and as DURABLE as any Fly-wheel Pump, and cannot possibly become DERANGED.

DIAMETER OF WATER CYLINDER..... In.	2	2½	3	3½	4	4½	5	6	7	8	9	10	12	14
DIAMETER OF STEAM CYLINDER.....	4 in.	5 in.	6 in.	6 in.	7 in.	7 in.	8 in.	10 in.	12 in.	12 in.	14 in.	14 in.	16 in.	18 in.
Length of Stroke	9 in.	9 in.	9 in.	9 in.	12 in.	12 in.	12 in.	12 in.	12 in.	18 in.	24 in.	24 in.	24 in.	24 in.
Content, Gallons per Hour	550	1500	2160	2940	3840	4860	6000	8640	11590	15360	19440	24000	34650	46380
Price..... £	18	22	24	28	35	38	45	60	70	85	130	140	180	230

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**R. S. NEWALL AND CO.,**

Sole Patentees of Untwisted Wire Rope.

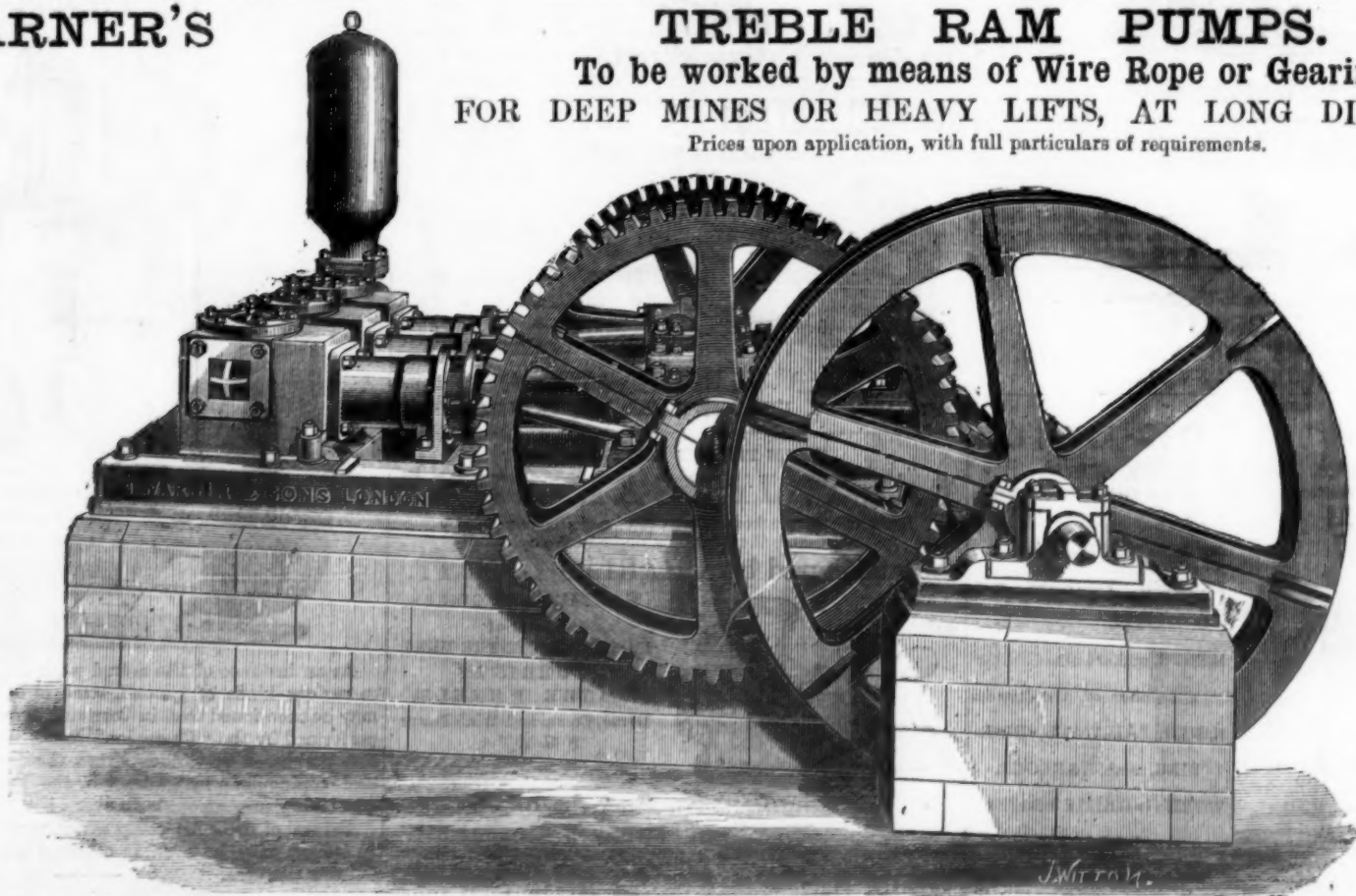
Iron & Steel Ropes of the highest quality for Collieries, Railways, Suspension Bridges, &c.

PATENT STEEL FLEXIBLE ROPES AND HAWSERS.
IRON STEEL, AND COPPER CORDS. LIGHTNING CONDUCTORS.
COPPER CABLES of high Conductivity for Electric Light and Power.

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Glasgow: 68, ANDERSTON QUAY.
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WARNER'S**TREBLE RAM PUMPS.**

To be worked by means of Wire Rope or Gearing.
FOR DEEP MINES OR HEAVY LIFTS, AT LONG DISTANCES.
Prices upon application, with full particulars of requirements.



As supplied to Messrs DOWES, of Springwell Colliery, Gateshead, for a Lift of (800) Six hundred feet vertical through two miles of pipes.

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R. HUDSON'S

Patent Steel Trucks, Points and Crossings,

PORTABLE RAILWAY, STEEL BUCKETS, &c., &c.

Telephone No. 14.
In connection with the
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places of business in the
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GILDERSOME FOUNDRY, NEAR LEEDS.

(Near Gildersome Station, G.N.R. Main Line, Bradford to Wakefield and London,
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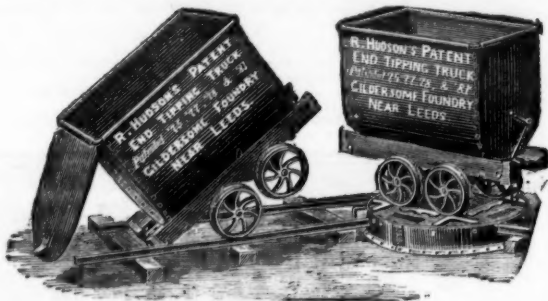
UPWARDS of 25,000 of these Trucks and Wagons have been supplied to the South African Diamond Mines; American, Spanish, Indian, and Welsh Gold, Silver, Copper, and Lead Mines; Indian and Brazilian Railways, and to Railway Contractors, Chemical Works, Brick Works, and Coal and Mineral Shippers, &c., &c., and can be made to lift off the underwork, to let down into the hold of a vessel, and easily replaced. They are also largely used in the Coal and other mines in this country, and are the **LIGHTEST, STRONGEST**, and most **CAPACIOUS** made, infinitely stronger and lighter than wooden ones, and are all fitted with R. H.'s Patent "Rim" round top of wagons, requiring no rivets, and giving immense strength and rigidity. End and body plates are also joined on R. H.'s patent method, dispensing with angle-irons or corner plates.

Patented in Europe, America, Australia, India, and British South Africa, 1875, 1877, 1878, 1881, and 1883.

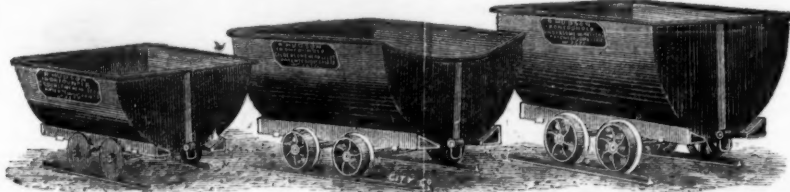
N.B.—The American, Australian, Indian, and Spanish Patents on Sale.

CAN BE MADE TO ANY SIZE, AND TO ANY GAUGE OF RAILS.

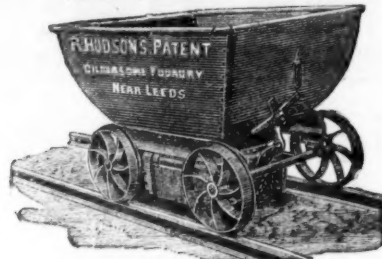
1.—PATENT STEEL END TIP WAGONS.



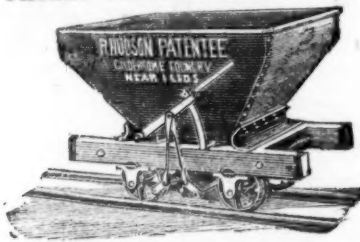
7.—PATENT STEEL MINING WAGONS.



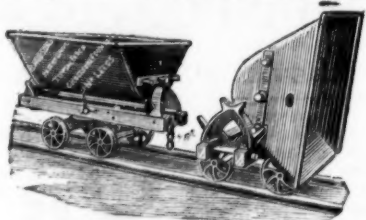
12.—PATENT STEEL HOPPER WAGON,
WITH BOTTOM DOORS.



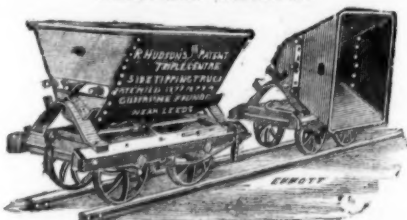
13.—PATENT STEEL HOPPER WAGON.



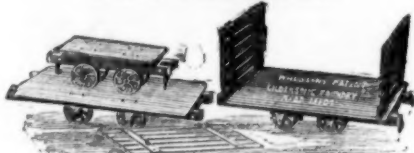
2. PATENT UNIVERSAL TRIPLE-CENTRE
STEEL TIPPING TRUCK,
Will tip either SIDE or either END of rails.



3.—PATENT TRIPLE-CENTRE STEEL
SIDE TIP WAGONS.



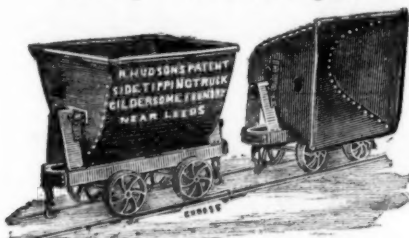
4.—PATENT STEEL PLATFORM OR
SUGAR CANE WAGON.



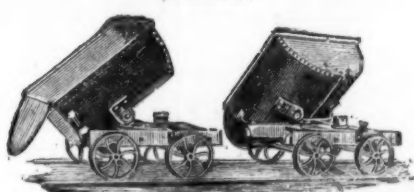
5.—PATENT STEEL CASK.
As supplied to H.M. War Office for the late war in Egypt.
DOUBLE THE STRENGTH of ordinary Casks without any
INCREASE IN WEIGHT.
(Made from 10 gals. capacity upwards to any desired size.)



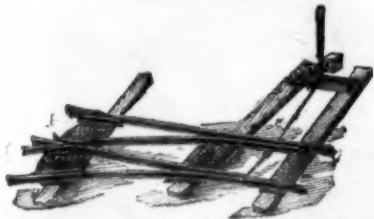
8.—PATENT DOUBLE-CENTRE STEEL
SIDE TIP WAGONS,
Will tip either side of Wagons.



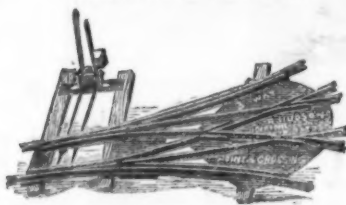
9.—PATENT STEEL ALL-ROUND TIP
WAGON.



10.—LEFT-HAND STEEL POINT AND
CROSSING.



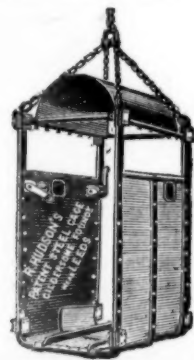
11.—RIGHT AND LEFT-HAND STEEL
POINT AND CROSSING.



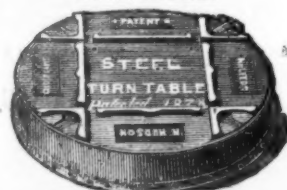
14.—SELF-RIGHTING STEEL
TIP BUCKET.
(The "CATCH" can also be made SELF
ACTING if desired.)



15.—STEEL CAGE.



17.—STEEL SELF-CONTAINED
TURNABLE.



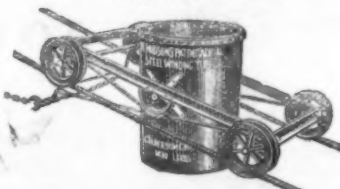
(Also made in CAST IRON for use where
weight is not a consideration.)

16.—PATENT STEEL WHEELBARROWS.
Made to any Size.
Lightest and Strongest in the Market.



A great success.

18.—"AERIAL" STEEL
WINDING TUB.



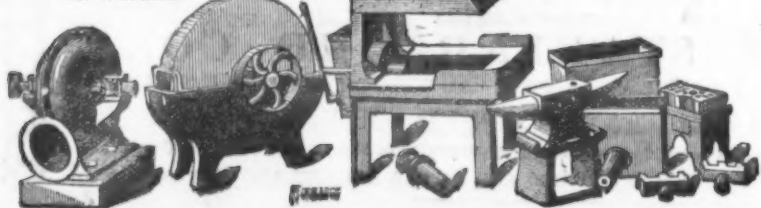
Largely employed in the South African
Diamond Fields.

No. 19.—PATENT STEEL CHARGING BARROW,
DOUBLE THE STRENGTH & much LIGHTER than ordinary Barrows



6.—ROBERT HUDSON'S
PATENT IMPROVED IRON SMITH'S HEARTH,
NO BRICKWORK REQUIRED.

A Special quality made almost entirely
in STEEL, effecting a GREAT SAVING
IN WEIGHT.



Large numbers in use by all the principal Engineers in this
country and abroad.

ALL KINDS OF BOLTS NUTS, AND RIVETS MADE TO ORDER ON THE PREMISES

BELL'S ASBESTOS.

BELL'S PATENT ASBESTOS BLOCK PACKING, for High Pressure Engines. This Packing has been specially designed to overcome the difficulties experienced by engineers and others in the practical working of engines of the most modern type of construction. The greatly increased skill and workmanship now obtained in the construction of engines and boilers have led to a rapid increase in the working pressure, the object being the attainment of a high rate of speed combined with economical working, the practical advantage of which, however, cannot be realised unless the Packings are so constructed as to avoid stoppages for the purpose of re-packing the stuffing boxes. It is now a recognised fact that the most perfect heat-resisting material suitable for the purpose of a Packing is Asbestos, but to ensure a successful application of this fibre, great skill is required in manufacture. In this Packing the Asbestos is woven into a stout cloth, and owing to the peculiar way in which it is manipulated, great elasticity is imparted to the Packing. This Packing has met with the most unqualified approval wherever it has been used, and on being taken out after about twelve months, working at 70 lb. pressure, it has been found to be in a perfect state of preservation, and was therefore replaced. The Patent Block Packing is square, as Fig. 1, and Figs. 2 and 3 represent the Round Block Packing with solid and hollow rubber core, and Fig. 4 without core, but with rubber inlaid. An Engineer writes as follows:—"The Asbestos Block Packing works splendidly. I have never seen its equal. We keep our gland nuts so that you can move them with finger and thumb, and can maintain a constant vacuum of 28½ in." As these packings are extensively imitated, and as it is a common practice among dealers and agents to supply the cheaper manufactures at my list prices, users are requested to see that the packing supplied to them bears my trade mark.

BELL'S ASBESTOS BOILER PRESERVATIVE. This useful mixture by absorbing the free oxygen that is in the water entirely checks pitting and corrosion. It also disintegrates incrustation so immediately as to prevent its adhering to the plates. Not only is a great economy of fuel effected by keeping boilers clean, but the risk of having the plates burned is thereby obviated. It has been computed that ¼ in. thick of incrustation causes a waste of 15 per cent. of coal; ½ in., 60 per cent.; ¾ in., 150 per cent. Thus the Preservative avoids the great risks which are inseparable from scaled plates, lengthens the life of a boiler, and covers its own cost a hundred-fold by economy of fuel. It is entirely harmless, and has no injurious action on metals. It can be put into the feed tank or boiler, as may be most convenient. Sold in drums and casks bearing the Trade Mark, without which none is genuine.

BELL'S ASBESTOS YARN and SOAPSTONE PACKING

for Locomotives, and all Stationary Engines running at very high speed with intense friction.

The following Testimonial refers to this Packing:—
Festiniog Railway, Locomotive Superintendent's Office,
Portmadoc, January 13, 1883.

Mr. John Bell, 115, Southwark-street, S.E.

DEAR SIR,
I have much pleasure in saying that the Asbestos Yarn and Soapstone Packing gives every satisfaction; indeed, better than we expected. We have a locomotive packed with it, which has been running five months (and think of the piston speed with our small wheels). I think the Soapstone a great improvement, as it keeps the packing elastic, and prevents it getting hard. I am very pleased with its working, and also the very low price for such good lasting Packing. The Asbestos Yarn we find is very useful, and answers admirably.
Yours truly,
(Signed) W. WILLIAMS.

BELL'S ASBESTOS BOILER AND PIPE COVERING COMPOSITION, for coating every class of steam pipes and boilers, non-combustible and easily applied when steam is up; adheres to metals and preserves them from rust; prevents the unequal expansion and contraction of boilers exposed to weather; covers 50 per cent. more surface than any other coating, and is absolutely indestructible. It can be stripped off after many years' use, mixed up with 20 per cent. of fresh, and applied again. The composition is supplied dry, and is only to be mixed with water to the consistency required for use.

A Horizontal Boiler, 17 ft. 6 in. long, 15-H.P., gave the following results:—

Temperature on Plates - - - 186 deg.
Covering - - - 94 deg.

One ton of coal was saved per week, and although the fire was raked out every evening, 20 lbs. of steam were found in the boiler next morning.

The following Testimonial refers to this Covering:—
Offices of the Wimbledon Local Board, Wimbledon,
Nov. 28th, 1883.

DEAR SIR,—It may interest you to know that we save exactly 40 per cent. in fuel through using your covering.—Yours truly,
W. SANTO CRIMP, C.E., F.G.S.

BELL'S ASBESTOS and INDIA-RUBBER WOVEN TAPE and SHEETING, for making every class of Steam and Water Joints. It can be bent by hand to the form required without puckering, and is especially useful in making joints of manhole and mudhole doors; also for large "still" joints where boiling fat and steam have to be resisted. It is kept in stock in rolls of 100 ft., from ¼ in. (Fig. 6) to 3 in. wide, and any thickness from ¼ in. upwards. Manhole covers can be lifted many times before the renewal of the jointing material is necessary. The same material is made up into sheets about 40 in. square, and each sheet bears the Trade Mark, without which none is genuine. It is very necessary to guard against imitations of this useful material, and to secure themselves against being supplied with these inferior articles at my price, users are recommended to see that every 10 ft. length of the Asbestos Tape purchased by them bears the Trade Mark.

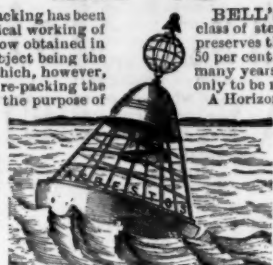
BELL'S SPECIAL LONDON-MADE ASBESTOS MILLBOARD, for Dry Steam Joints, made of the best Asbestos fibre, is well-known for its toughness and purity, and is absolutely free from the injurious ingredients frequently used to attain an appearance of finish, regardless of the real utility of the material. Made in sheets measuring about 40 in. square, from 1-64th in. to 1 in., and ¼ millimetre to 25 millimetres thick. Each sheet bears the Trade Mark.

BELL'S ASBESTOS EXPANSION SHEETING (PATENT).

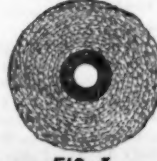
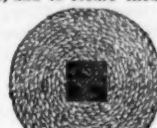
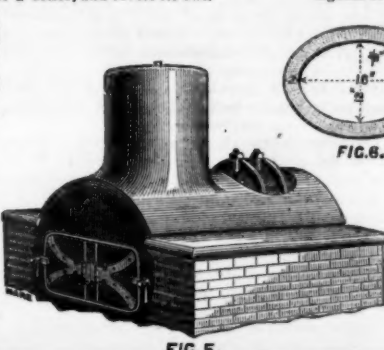
This Sheeting is another combination of Asbestos with India-rubber, giving to the steam user the special advantages of both materials.

The India-rubber Washer is protected from the action of heat and grease by an outer coating of vulcanised Asbestos Cloth, thus producing an excellent joint where expansion and contraction render other materials unserviceable.

This material is admirably suited to steam pipe joints and every class of valve. Valves made of this material are very durable, as they are not subject to injury by oil.



The goods of this house are of the highest quality only, and no attempt is made to compete with other manufacturers by the supply of inferior materials at low prices. All orders must be sent direct to the under-mentioned depots and not through Agents or Factors.



BELL'S "ASBESTOS LUBRICANT."

ILLUSTRATED PRICED CATALOGUE FREE ON APPLICATION TO

BELL'S ASBESTOS WORKS, SOUTHWARK, LONDON, S. E.

OR THE DEPOTS—

Victoria Buildings, Deansgate, MANCHESTER.

11 and 13, St. Vincent Place, GLASGOW.

39, Mount Stuart Square, CARDIFF.

21, Ritter Strasse, BERLIN.

T. LARMUTH & CO.,

ENGINEERS,

MANCHESTER, ENGLAND.



SOLE MAKERS OF
MCCULLOCH'S
PATENT ROCK DRILL CARRIAGE

STEAM CRANES, OVERHEAD TRAVELLERS,
ENDLESS CHAIN ELEVATORS, AND FEED SHEETS,
TRAVERSERS AND TURNABLES,

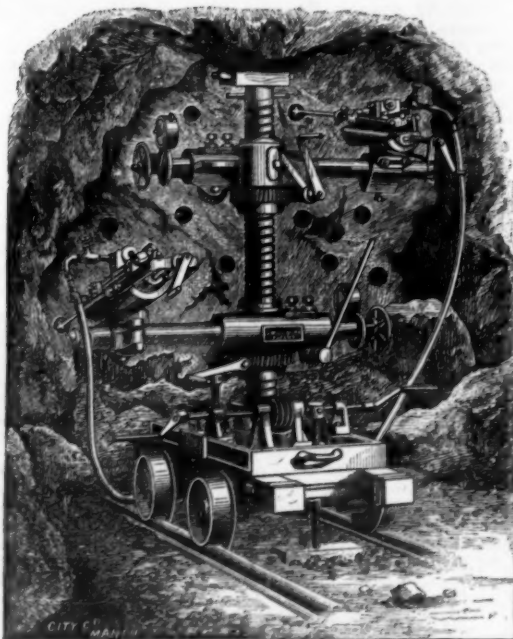
Engineers' Tools of every description.

LLOYD'S FANS,

MINE VENTILATING FANS,
CENTRIFUGAL PUMPS.

SHAFTING, GEARING, AND PULLEYS.

Sole Makers of J. Priestman and Son's Patent Leather Striking Machines.



MAKERS OF
STURGEON'S NEW

PATENT TRUNK AIR COMPRESSOR
WINDING AND PUMPING ENGINES,

IMPROVED CONDENSING AND NON-CONDENSING HIGH-PRESSURE

STEAM ENGINES,

With Ordinary or Expansion Valves, Compounded on Non-Compounded

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WEST AFRICAN GOLD FIELDS COMPANY.

SIR,—I was induced to take shares in this company on the faith of a number of statements made by the directors in an advertisement published by them in July, 1882. Briefly these were "that we might look for dividends in six months from washing alone, pending an intended re-sale of such parts of the property as the company did not want to work themselves, at a price which would return a sum equal to the whole capital of the company several times over."

And to show that this was no speculation the directors stated as a fact that they had an offer of 40,000*l.* for a portion of the property, subject only to their accepting it by a certain day, and that they would close the list of applications for shares before that date to enable them to do so. This they did, and subsequently informed me that the sale agreement had been completed, that the sale was a *bona fide* one, and that I might rely upon it as such. Eighteen months have now elapsed, but no dividends have been obtained from washing or any other source, and I have good reason to believe that the sale for 40,000*l.* (which offered a strong inducement to the public to apply for shares before the closing of the lists) has never taken place. I know nothing about the affairs of the company; but have received a circular in which I am told that a "meeting will be soon held at which its present position will be explained to us."

Being abroad on account of my health I shall be unable to attend it; but I think I can pretty well forecast what will take place. We shall probably be told that the Chairman has been at the mine for some months; that as a result the board find it more valuable (even) than they expected. "But" that more capital is required to work it. This is all very good, and no one will be more delighted than myself to hear it. But there is something else I want to know which is far more important—If the directors consider the prospects so good, how much of their own capital have they put in it?

When they first brought out this company and made the magnificent statements I have referred to, I elicited the fact that out of 100,000*l.* capital they asked the public to subscribe, the whole board (seven in number) had only put in 14*l.* [It is not clear from our correspondent's manuscript whether he means 14*l.* or 1400*l.*—ED. M.J.] amongst them. Had I known this in time I would not have put in one shilling, and the board seemed to see that there was a good deal in my objection, for on my calling their attention to this remarkable fact they wrote to me through their solicitor to say that "they intended to increase their holdings." I have again and again written to ask if they had done so; but I cannot get a satisfactory answer. I should much wish to have one; and now ask again—Have they done so? To what amount? And if not, why not?

There can be no fairer or more proper question to ask, for it must be remembered that the success of the company is of far more importance to them than to us. They promise us that we shall not only receive handsome dividends, but also treble our capital if we put our money into it. So will they, and be paid as directors besides. They know all about it and its position. It is only fair, then, that they should tell us clearly and straightforwardly how many shares have they allotted to themselves and paid for at par? I put the question advisedly in this shape because I took my shares by allotment at par, and I believe only about 3000 were issued in this way out of a total number of 50,000; but I was since offered them by dealers at 90 per cent. discount. To have bought these would not have helped the company, which depends for working capital on the sale of its unallotted shares.

I sincerely trust that the insertion of this letter in the *Mining Journal* may be of service to our company by drawing a satisfactory answer from our directors. If they intend to apply to the shareholders and the public to entrust them with their money, it will go much further in inspiring confidence than any amount of statements or promises if they can show that the directors themselves (with a knowledge of the prospects far superior to any we can pretend to) are not afraid to put their own into it.

ORIGINAL SHAREHOLDER.

GOLD FIELDS OF THE TRANSVAAL.

SIR,—Under the above heading, in your valuable *Journal* of Saturday, "A. F." endeavours to enlighten the British public as to the value of the Transvaal Gold Fields, by publishing a letter from a Mr. Dick, who, he says, is a "Natal Colonist of 40 years' Standing;" and, judging by the tenor of Mr. Dick's letter, I should think he was a very old man when he wrote there—for, if Mr. Dick was not suffering from a fit of temporary insanity, his letter shows plainly enough that he is in his dotage. When Mr. Dick wrote that a coloured man was appointed Administrator of the Transvaal he wrote what he knew to be a falsehood, and displayed an amount of animus sufficient to throw discredit on the whole of his letter.

Mr. Dick's description of the gold fields, which he gathered from an old book purchased at a bookstall, does not refer to the Transvaal at all, but refers clearly to the Tatin Gold Fields in the Matabele country, just over the Transvaal border, in about 27 to 30° east and 21 to 30° north. The "misnomer," which Mr. Dick complains of, seems to me to be in the heading of his own letter, which would have been more appropriate if it were headed "Essay on Escaped Convicts," with whom the poor old fellow seems to have a disagreeable acquaintance. Mr. Dick's experience in gold mining is such that in the interest of the public I hope you will allow me to give it in detail in his own words. "About 45 miles from Pretoria one day, travelling in the mail-cart, we unharnessed the mules, to let them feed and rest for an hour. A seam of reddish-coloured quartz crossed the road just there, so I took a small hatchet or pickaxe (I wonder which), generally carried with these conveyances, and by dint of sheer hammering got a bit about the size of my fist, and perhaps 1½ lb. weight. No gold or traces of it were visible, but a fellow passenger told me it was the true gold-bearing quartz. I put it in my pocket, and on arriving back at Pretoria I took it to the 'smiddy' of Mr. Samuel Jenkins, blacksmith and wagoner, and he permitted me to roast the piece of quartz on his fire. After cooling it was pounded in a mortar by Mr. John Wyman (late of Challoner's Apothecaries Hall, Durham, and then of the firm of Brodric and Wyman, merchants, Pretoria), and some mercury put thereon, and rolled about in it. The mercury took a distinct tinge of gold (?), although no speck or grain was visible in the quartz. This is all I know about digging personally."

Mr. "A. F." says the above "is very interesting, and shows there is abundance of gold there;" but I doubt whether many of your readers any more than myself will be able to see it in the same light, and I fail to see how Mr. Dick's letter can benefit the Transvaal or the public. I know the auriferous capabilities of the Transvaal better than most people, and I may inform Mr. "A. F." and the public that if a line be drawn from Lake St. Lucia to the Tatin gold fields gold will be found at intervals for about 50 miles on either side of the said line. There are many places in the Transvaal which will pay very well to work for gold; but it bears no comparison to California, South America, or Australia. The payable gold in the Transvaal appears to be concentrated about certain centres widely apart from one another. Each grand centre, so to speak, has subordinate centres. Pilgrim's Rest is evidently a grand centre, and Macmac, Lisbon-Berlyn, and Spitzkop are subordinate centres in which groups of payable shoots of gold have already been found. The other places where I have seen gold are—New Belgium, Hanglip Mounts, Erstling, and Devonshire. At a place named Blanbank, which is outside the line indicated above, there are two or three large quartz reefs, which would pay a well-conducted company to work. The average run of those reefs is about 4 oz. of gold per ton; but I tested one gossaniferous vein, about 9 in. broad, which would yield with ordinary treatment at the stamps 2 oz. of gold per ton; but the chances of getting a large quantity of this kind of ore are not favourable. I did not "roast my samples on Mr. Jenkins's smiddy fire," but I got more than a "tinge" on the mercury. I found gold in all the above-named places long before the English retired. Mr. Dick thinks there is "one *bona fide* company in London with a respectable directorate." Very kind of Mr. Dick, I am sure. But all the other vendors of gold mines Mr. Dick characterises as ugly, Brighams, thieves, mur-

derers, and the committers of every crime under Heaven. Flattering to the *elite* of South Africa very. But Mr. Dick says those gentlemen are offering properties that have no existence.

Now, Sir, I do not know anything of the antecedents of any of the vendors of Transvaal gold mines, and it is immaterial to me whether the mines be worked or not; but, as I know the capabilities of the country well, I have watched their introduction into the English market with interest, and I must say that as yet I have not seen a property introduced which does not contain the elements of success, and which is not capable of paying fair dividends on a fair amount of capital. The mistake which is being made by English investors in the Transvaal is they are paying too much for their properties, and, with one exception, the prices asked and given are about 200 per cent. above their value.

The Transvaal Gold Exploration and Land Company is a valuable property, and if it were properly conducted it is worth double as much as all the other diggings combined. But, in my opinion, the company has made a great mistake in sending out such a lot of steam-engines when they have such a magnificent stream of water which could be brought on to the payable runs of gold for less than the engines will cost to place on the property. Fuel, too, is very scarce, and only in the carting alone it will be a very expensive item. In introducing their machinery the company has been very badly advised. Water on the gold fields is the great desideratum, and if they had started to develop their property according to my ideas of gold mining they would ere this have received a dividend of fully 50,000*l.* However, if the shareholders are content I am.

The Lisbon-Berlyn Company has about 10 acres of fairly good ground. I see the vendors have agreed not to sell any of their shares for 12 months; but is it possible that any of the shareholders are so verdant as not to see through this transparent trick of the trade? If they stock the gold on the property for 12 months it is not very likely they would attempt to sell their shares before the gold was sent home. This party has a rich line which has been exposed, and held up as an advertisement for about two years, the whole of which could be broken, and 90 per cent. of the gold sent off in a fortnight. If I were the manager of this concern, and kept the gold on the property instead of sending it home, as they are doing, I would not object if any person called it dishonest. I must refer to the other diggings in another letter; in the meantime I would advise Mr. Dick and the public to make themselves acquainted with the tricks of the trade. All the concessionaires of the Transvaal gold farms are moneyed men who can afford to develop their properties much better than the majority of the English subscribers; and I would particularly remind them that 50,000*l.* worth of gold can always be purchased for 50,000*l.*, although it may cost 200,000*l.* to find it.

City, Jan. 28.

GOLD MINER.

GOLD COAST MINING.

SIR,—Allow me through the medium of the *Mining Journal* to correct a mis-statement published last week, in which Mr. Haughton, who was sent out to report on the Gold Coast Company's Mine, at Abontuyakoon, takes upon himself to say amongst other things:—"Mr. Gowans is deserving of great credit for what he has accomplished, not only for the manner which he has developed the mine, but also for the erection of the machinery. I am astonished that he has succeeded in accomplishing so much without the aid of a single mechanic that ever saw a quartz crushing battery until he went out there, and even now it necessitates his being continually at the mill, for if anything goes wrong he has no one with him that knows anything about it. I have a slight attack of fever to-day." Now I think it would have been better if Mr. Haughton had made a few enquiries before he rushed so recklessly into the matter, and that it would have been advisable before making such rash assertions that he should have tried to justify the statement made by the Chairman at the meeting of Jan. 8—when Mr. Haughton was called before the board someone said to him I hope you will give us a good report. He said "I shall give you a true and faithful one good or bad." Now I should have thought on the strength of such remarks that he would have been more careful in what he writes home to his employers, and have adhered to statements that would bear looking into, as there are many persons on the Coast and in England who can disprove all he has said about the development of the mine and erection and working of machinery. Although Mr. Haughton has a perfect right if he thinks proper to help Mr. Gowans out of his difficulties by giving him credit for things which he has not done, yet still in fair play he might have done so in a better manner than trying to stultify the mechanics and miners, who were picked men, sent out at great expense by the company, and who have I have not the slightest doubt given full proof of their abilities in their several branches before they ever met Mr. Gowans. To prove my assertions I will now give those interested in this mine a synopsis of the history of it:—

MINING WORK.—The mine was fully opened by Mr. Jefferies, and has been since carried on by Mr. Little, assisted by Mr. Davies, Mr. Little having previously worked on the Effuuta Mine on the same range as the Gold Coast Mine.

ENGINEERING.—The principal part of the machinery was erected by Mr. Evans, assisted by Mr. Emery, the mill which he mentions so particularly being erected by Emery; all the running gear mill included being under the charge of the above.

The principal part of the machinery was erected during Mr. Gowans' frequent absence from the mine. Again how Mr. Haughton can reconcile his statement that no one knows anything about this mill except Mr. Gowans, when it was doing the best work it has done when he was in England. Again may I ask why should Mr. Haughton claim for Mr. Gowans the credit for doing all the work done at the mine, &c., except the work which he was engaged to do, and which he so lamentably failed to accomplish (see the Chairman's remarks at the meeting of the company, Jan. 18)—that they had sent out Mr. Haughton to the mine to report upon matters in consequence of Mr. Gowans not being able to extract the gold, although he had got most valuable ore. Now I should think it would be better for Mr. Gowans to try and improve himself in his own business instead of trying to take the credit of other men's work, and it seems to me that although a man may have resided in Australia for a few years, and might claim to be a reduction officer, mining and mechanical engineer, it does not follow that, although calling himself an Australian, that he understands his business. This has been abundantly proved during the course of the present management of the Gold Coast Company's property, and I should think it would be better for Mr. Haughton not to write when he has fever, as the climate has a peculiar effect on some constitutions. JUSTINE.

THE GOLD FIELDS OF VENEZUELA.

SIR,—Abundant proofs exist that gold may be found in many parts of Venezuela, either in the form of alluvial deposits or quartz veins; but the auriferous wealth of the country appears to be specially concentrated in the great State of Guayana, comprising the world-famed El Callao Mine, situated in the district of Caratal. The gold mines of Guayana are now assuming increasing importance, and signs are not wanting that the day is not far distant when the enterprise and energy of English capital will be recompensed. On Feb. 20 the election of the new President of Venezuela takes place. The popular candidate is the politician most respected in the mining districts of Guayana, the brave General Venancio Pulgar; and, according to the latest advices from Trinidad, it is almost certain that this eminent statesman and soldier will be elected to preside over the destinies of the United States of Venezuela. If this happy result be realised, and we have little doubt it will be so, this magnificent and rich country, under the rule of Pulgar, will take a new departure in the development of its immense resources. General Venancio Pulgar has always taken great interest in the progress of industrial enterprise in the country, particularly in connection with the gold mines of Guayana, having been for some time Governor of that territory. He has introduced new and good laws, and he is the energetic pioneer of the railway from Puerto Las Tablas, on the Orinoco, to Guacipati, the capital and centre of the mining district.

The Guayana Company (an English company) has already completed the surveys, and the construction of the railway will shortly be commenced. We are justified in saying the completion of this important work will totally change the economic condition of mining

enterprise in favour of the investor; the cost of labour, supplies of all kinds, transport, &c., will be immensely reduced. All classes of the people of Trinidad approve the election of General Venancio Pulgar, and desire to see him the supreme chief in Venezuela. The merchants of this English colony know and appreciate his high character and abilities, both in private life and as a politician. They know him as the friend of progress, generous and liberal in his policy, always ready to give to commerce (that chief promoter of peace and civilisation), a noble and disinterested support. The newspaper press (the organ of public opinion in Trinidad) unanimously approve General Pulgar's candidature, and earnestly desire to see him the President of Venezuela.

The latest published returns of the mine El Callao show a produce of over 13,000 ozs. of gold for the month; the Chile, 3000 ozs.; the Nacupai, 700 ozs. At the Potosi Mine operations are being actively pushed forward on the Peru lode, and the results thus far are very satisfactory and promising. At the Panama Mine crushing of quartz has commenced, giving 2 to 3 ozs. of gold to the ton. So much for the Nueva Providencia district. Let us now glance at the Cicapra district. The Cogayal Concession, the property of the Cicapra Gold Mining Company, affords proof of all that experts have stated of its richness. Some preliminary and superficial work recently carried out proves conclusively that there is abundance of gold in the creek running through two-thirds the extent of the concession, and that vigorous working will, no doubt, produce large quantities of free gold without heavy expenditure. New discoveries of gold are being constantly made in this district, and competent experts maintain that throughout the territory traversed by the River Yuruari well defined and rich quartz lodes are found. Mr. J. Pryor, engineer, has recently discovered a fine lode 3 ft. wide, producing at a few feet deep 9 ozs. of gold to the ton of quartz. These are facts that need no comment, and we confidently anticipate results from the Venezuelan gold fields that will more than rival the fame of California.

VIATOR.

POTOSI GOLD MINING COMPANY.

SIR,—Who would have imagined that the flowery prospectus issued by the promoters herein three years ago with so much *colat* would turn out to be on a par with those framed by vendors of property who reside abroad, and who make the English market a convenience for disposing of their surplus valuable (?) properties? Where are the realisations of the italicised statement of the promoters of this additional marvellous specimen of a foreign mine now, which statement in the said prospectus pointed out as the golden bait that this low-priced property on its sale was then producing an average of over 100 ozs. of standard gold for each full day's work, worth 380*l.*? Was this true at any time? Did such a result ever take place from the first hour this company became the fortunate purchaser of this puffed up foreign conglomeration of petty concessions originally purchased, in comparison with the price paid, for a mere song? No. And then, again, after spending all the money subscribed for working this undertaking, in addition to a like sum nearly of 100,000*l.*, and the amount realised from the gold produced, the shareholders are notified of the necessity of winding up the company because it is bankrupt. Only fancy, after all that has been done and said, this splendid investment, not speculation, as the undertaking has been described, has spent almost the amount of its capital in cash on working the same, and purchases of new machinery, &c., and not one farthing even returned by way of dividend. Upon what terms, too, is this proposed winding up to be carried out? That a friendly liquidator shall be appointed, and a reconstruction brought about, whereby shareholders in the old company will forfeit one-half their present holding, and pay one-eighth of the par value of the number of shares now held by them. It is a monstrous proposition, and if the shareholders submit to it one can only imagine that more "birdlime" has been thrown upon them with a result that can be easily inferred!

Why are not the vendor or vendors (who I think are resident within the legal jurisdiction of this country) called upon to make some amends to the righteously indignant shareholders who from time to time have been treated so liberally to their specious promises? Let Mr. Somes and his co-vendor or co-vendors place (say) 90,000 ordinary shares of the present company at the disposal of the directors, who, if one may believe their statements, were most egregiously misled when they were asked to join the board originally. If this were done I would offer by way of suggestion, the following scheme (or something of a like nature, as being more in consonance with that desire for rectitude which the shareholders have frequently been assured actuates the minds of the vendors of this property. I would suggest, say, that the borrowed monies—96,425*l.* should be allowed to remain; that the vendors should place 90,000 ordinary shares out of the 99,000 originally allotted to them as part purchase for disposition amongst the shareholders, who should pay for them at the rate of 5*s.* per share; that in addition to this, and in consideration of having such shares placed at their disposal, such shareholders should also pay (say) at the rate of 2*s.* 6*d.* per share (by way of additional debentures) for each share held by them, and if this were done no winding-up would be necessary nor any reconstruction, with their concomitant train of expenses for liquidation, registration, &c.; but the company would have a larger sum for its purposes than they would have by the scheme now propounded for their adoption, and which, to say the least, is one that only is likely to benefit the vendors, according to the opinion of—

H. W. HIGGINS.

Cheapside, Jan. 30.

CINNABAR DEPOSITS—THE SULPHUR BANK QUICKSILVER MINE OF CALIFORNIA.

SIR,—The geological structure of these mines is very singular, and differs from any other in the State. The surface is divided into two sections, apparently disconnected, and consequently the cinnabar in each must have been formed through independent channels. The main body or metal bearing has an elevation of about 50 ft. above the lake, capped by a non-productive decomposed white rock and clay of about 20 ft. thick. The rock is augite and andesite, irregularly fissured at the time of its solidification, and subsequently infiltrated with metal solution containing mostly ore of quicksilver. At a point called Wagon Spring out at the eastern extremity, and in the old river bed, a very rich body of cinnabar was discovered, and followed to the depth of 72 ft. by means of an open cut, and from here, about 200 yards towards the lake, a sedimentary channel of decomposed sandstone was revealed, from 15 to 20 ft. thick, underlying the lava, which yielded very rich ore, but which failed to make downward—one rich boulder, 500 lbs. of 46 per cent. ore, was taken out, also charred wood.

Explorations on this Wagon Spring out chimney have been prosecuted to the depth of 310 ft. by means of a perpendicular shaft, and tunnels extended north from same at intervals of 50 ft., 140 ft. in length; the average length of the ore was 90 ft., and width 40 ft. There is no regular vein, but a metalliferous belt, in which the foregoing deposit made itself, intermixed with large and small deposits of sandstone, bearing veinlets of cinnabar from 1 to 16 to 24 of an inch in thickness. The ore does not penetrate the rock but in the face of fracture, caused either by contraction in cooling or by an earth shock, and the cinnabar subsequently deposited by passing solution. The water contained in this belt is from 165° to 200° Fahr., and the most reasonable solution for this hot water is its connection with an expiring volcano located about a mile to the east, and the high temperature of the ore fissures worked in the hill, and overlying the metalliferous belt, must be caused by the heated vapours arising therefrom.

At the 210 ft. level the ore body, with exception to a few stringers, entirely gave out. It is evident the ore infiltrations of the hill mine principally emanated from this point; but there are chimneys or outlets clearly traceable that supplied a portion. The Indian camp section was undoubtedly formed through a separate and distinct chimney. The ore made in the clay and decomposed rock, extending near the surface, and to a depth in places of nearly 20 ft. There are large bodies of cinnabar yet to be found by following these chimneys downward, and under ordinary intelligence the mines should be paying dividends instead of being closed down. Under the management of Mr. White the mines were a great success; but

after his resignation, although he left a rich mine in sight, the mine went continually in debt, assessments levied, and now finally abandoned.

Bonanza drift gravel in Howland Flat, Sierra County, California, owned by an English company, and superintended by Mr. Sutherland, the channel is now, I think, worked out. **MINE:**
Lake County, Jan. 9.

KAPANGA GOLD MINING COMPANY OF NEW ZEALAND.

SIR.—The readers of the *Mining Journal* will doubtless have observed from time to time the meetings of the stockholders of this company, called for the purpose of putting the company on a paying basis, which meetings have up to the present time apparently been without any good results. Some time ago an advertisement appeared in your columns for an independent mining expert to visit these mines, and report as to the trouble. I (and doubtless others) answered that advertisement, but receiving no reply thought nothing further of the matter, being fully engaged at the time in superintending the setting up of some machinery in one of the camps of this territory; but on reading the report of the meeting, held on Oct. 9, my attention was again drawn to the matter, and I took the liberty of embodying my views in a letter to the Chairman, Mr. Tufnell Southgate.

In that letter I endeavoured, as far as a stranger could do, to analyse the statements made at that meeting, and I think showed pretty clearly the weak points in the company's management, without any desire whatever to cast any reflections on the resident superintendent, as I know from considerable experience that many things occur on the ground to try the patience of the manager that cannot be seen from a distant standpoint. As the above letter was in nowise a private or confidential communication, I now give you below extracts from it for publication for the benefit of the parties interested:—

"I have been much interested, and pardon me if I say much astonished, at the report of your special meeting, held on Tuesday, Oct. 9, at which some of the most extraordinary statements were apparently made and accepted without a word of comment—e.g., 15 stamps were said to be in operation, and only crushing $1\frac{1}{2}$ ton of rock per diem. The thing is preposterous. What can be the weight of the stamps? 15 stamps of weight—say, from 650 to 750 lbs. each—ought to crush at the lowest possible calculation from 10 to 12 tons per day of 24 hours, even if the rock was as hard as the nether millstone. Again you are said to employ 38 men. What are they all doing? Suppose you work three shifts of miners in the 24 hours (which is the most economical way) you could not begin to require so many men unless you have several openings, or are doing a very disproportionate amount of dead work, and are working under the most extraordinary and inconvenient circumstances. But if 38 men are employed what becomes of all the ore over and above the 18 ton which is reduced daily? Not knowing the width of your vein and other data necessary to form an estimate, it is impossible to calculate the amount put out by each shift, but you certainly must be accumulating a considerable amount on your ore dump, although no reference or enquiry seems to have been made on this point.

Again, in the report above alluded to, a gentleman makes the statement that there is plenty of quartz, rich quartz, but he adds not enough of it. What is meant by that? If there is plenty how is it that there is not enough? The trouble at your mines, looking at them from this distance, and in view of the points gathered from these meetings, seems to me to be in the large amount of labour employed as against the small amount of ore reduced. One thing is evident—there is something radically wrong with the stamps. With ore at an average of $1\frac{1}{2}$ oz. per ton your property ought to yield a considerable income over expenditure. Your rock averages $1\frac{1}{2}$ oz., and you are crushing $1\frac{1}{2}$ ton per day—that yields $2\frac{1}{2}$ ozs. per day of gold, and in a month, allowing 26 working days, 58 ozs. Gold sells here to the mints at from \$17 to \$19 per ounce, or, reckoning a sovereign at \$4 84, at about 31. 14s.: 31. 14s. English money, taking \$18 as the medium price here, so that 58 ozs. would give 2167. 9s. as the month's production; but if your mill can be kept at even a very moderate rate of work—say, only 5 tons per day—you would get a monthly return of 721. 10s. as against your expenditure of 5000. If your mill is worth anything at all, and you have anything like reasonable facilities, this estimate ought to be doubled, or at least increased 50 per cent.

Of course there are many things that parties at a distance, and with only imperfect knowledge of the facts as they actually occur on the ground, cannot realise that may interfere to prevent success; but the fact distinctly stated that a 15-stamp mill only reduces $1\frac{1}{2}$ ton per day of ore is utterly incomprehensible, and in my opinion there is where the weak point is, coupled with an apparently very large excess of labour. I say apparently very large excess, for not knowing the various points necessary to form a just conclusion it is impossible to say whether the amount is excessive or not; the superintendent must be guided largely by his instructions from headquarters, and by what in his judgment, as being on the ground, is best for the interests of his company. Where so small an amount of bullion is produced non-productive labour should be restricted as much as possible, and that employed to the very best possible advantage, and at points best calculated to develop the mine and increase the revenue. It seems to me that with due regard to these points, if the ore is really as stated, that the stock of your company instead of being worth only about 2s. 6d. ought to be at least at par—nay more, at a premium."

Las Vegas, N.M., U.S.A.

JOHN ROBINSON,

Mining and Consulting Engineer.

FAIR TRADE AND PROTECTION.

SIR.—I am far from desiring to hurt the feelings of "Common Sense," so if he did not, as he appeared to do, regard "depressions in the tin market" with either a "bullish" or a "bearish" eye, I must conclude that he would only welcome a depression after being surfeited by a long continuance of unbroken prosperity. He declares that there is perfect agreement between himself and "Reciprocity," because the latter hopes he may be a false prophet of evil. Therefore, if we agree *mutatis mutandis*, "Common Sense" hopes that he may also prove to be a false prophet. Free Trade principles, which "Common Sense" solemnly avows his great and ever-growing faith in, are, as he intimates, no doubt a grand affair; but then as these principles have never been carried out by any nation, we cannot judge of what their effect might be. The thing which old fossils delight to honour, and fondly term Free Trade, is not founded upon Free Trade principles; but upon a wrong-headed perversion and distortion of those principles. Reciprocity is the wisest course. Thus, if America wants to send wheat to England duty free, let her admit English iron and steel duty free, or let both pass with a moderate duty. If "Common Sense" is a tin miner, and is pleased with what he calls the great Free Trade movement, he must be a philosopher of the first magnitude, especially if he lives on the profits of tin mining. In his first letter on this subject "Common Sense" declared Protection dead because the great Conservative leaders declare it to be impossible to return to it. But I see one of these great leaders—great in mind if small in body—actually making public speeches, pointing to a return to "the impossible."

"Argus" has written a capital letter, illustrating what Free Trade has not done, and what it has done; but he might go much farther. English capitalists in France and elsewhere are "setting up factories, and by means of cheap labour and power are ruining their fellow countrymen by competition, not in agriculture and mining alone, but practically in everything. No trade is too great or too small for the devouring man of the Cobdenite destroyer, and yet with the clear evidence of France and America, though very much protected, prospering, and progressing, even more than England has done, most statesmen and the bullionists, still point to their one-sided abortion as the source of England's wealth and greatness. It is much as if they affirmed that human beings would be better off with one leg and one arm each than complete as they are. There Free Trade is but a poor crippled thing, suffering from paraplegia; it has but one side. Either Protection must again come to the front, or the Jingo must force our wares upon all nations at the point of the bayonet, or as a third alternative England will become Communistic, and fall to the rank of a fourth or fifth rate power.

Had the anti-Corn Law men been content to meet the farming in-

terests half way, much evil would have been avoided; but they found it necessary, in order to bamboozle the poor working men sufficiently, "to go the whole hog." England is short of food because it has ruined its agriculture, and has so tied up the land that no one cares to put capital into it. Much is said about economising in mining for tin, copper, and lead; all this is much to be desired, and probably a great step in that direction would be that the "no credit" system should be adopted in all mines under the Cost-book System. This has been done at West Kitty, West Polbreen, Wheel Coates, Wheel Crebor, Trevaunance, and some others. Debit balances should be cleared off at each meeting, so that shareholders might always know their position, and so that little defalcations and irregularities might be rendered impossible. Every mine should clear off its debit balance at its next meeting, and then adopt the "no credit" system. Were this done mining affairs would look brighter, though as far as my judgment goes the low price of metals will, save in a few exceptional cases, render all efforts in vain. The lords ought to agitate for Protection, and submit to moderate dues. Otherwise the time is fast approaching when they will have no dues to receive, for mines will not always be kept open for their exclusive benefit.

Jan. 28.

RECIPROCITY.

FREE TRADE, AND FAIR TRADE.

SIR.—The time has evidently arrived when the commercial policy of England will have to undergo a full investigation. Facts, which are "stubborn things," are forcing themselves before the eyes of the nation, bringing again into view the old principle of "live and let live" among nations as well as individuals. For a very long period it has been a common belief that England but for its wisdom and foresight must have sunk under the "withering influence" of Protection. What, however, has been the actual result? With Protection the commerce of America has advanced with prodigious strides, and while paying off their great war debt with wonderful rapidity they are earnestly hoping that "Old Britain may not be drained dry" before their debt is completely cleared off.

The commerce of America in 10 years increased 63 per cent., and France 51 per cent., with full protection, whilst England, with its boasted Free Trade (a one-sided policy which in reality is no Free Trade at all) reached only 21 per cent. It has also been generally thought that but for Free Trade the price of corn in England would have been ruinous; but how does the matter really stand.

The yield of wheat arising from the cultivation of land in the vast extent of country in America, Australia, and other nations has greatly exceeded the requirements of the population of the world. The Statist of Aug. 21, 1882, says that the world's yield of wheat was estimated at 34,500,000 qrs., for which there were markets for only 26,000,000 qrs.—United Kingdom, 15,000,000; European Continent, 9,000,000; and Sundries, 2,000,000 qrs.; leaving 8,500,000 qrs. absolutely without a market.

America, France, Germany, Russia, Austria, Italy, and all other nations throughout the world protect themselves in treating with their customers—a system which England has dropped. During the past ten years England has been driven to buy 85,000,0000. worth of commodities per annum from America alone, her sales to that country reaching only 29,000,0000. per annum. America all the while charging duties on British products of from 40 to 200 per cent. Can the mining, agricultural, and the general commercial interests of England continue to stand under such a crushing mode of dealing as this?

Jan. 29.

FAIR TRADE.

TRADE OF THE UNITED KINGDOM, 1883—No. III.

SIR.—It is surprising that so few people, comparatively, take intelligent interest in the truly marvellous periodic "Returns" of the Board of Trade. Their approximation to accuracy is nearly perfect, with the exception, perhaps, of the declared values of exports to countries where, on arrival, they are met with prohibitive customs duties; so that, probably, out-trading invoices may not always represent real values by something like 25 per cent. Let this pass. Taking the declared values as they stand recorded, the picture is sufficiently startling. In the first place the merchant-marine movements outward and homeward represent nearly 66,000,000 of tonnage. The produce freighted outward shows a value of more than 320 millions sterling, and that brought home a value of nearly 443 millions sterling; or, simply putting it, as 9 to 12—say, 9d. to 12d.; so that, it may be that our outward ninenepe brought back a shilling.

On analysis the most startling fact of all is, the sums paid for food-stuffs—184,000,0000. sterling, to which, if added about 35,000,0000. for clothing purposes, we have accounted for nearly one-half the total declared value of our imports for the year. That is for sustenance. Again, a glance at the gold and silver coin and bullion shipped to and fro reveals curious anomalies as to the senders and receivers, and it is somewhat of a conundrum as to the true value of these items in the conduct of the business transactions involved in British imports and exports, in relation to their declared value of 763,000,0000. sterling. Inasmuch as there was a balance of 725,0000. in favour of imports, it would seem as if the 33,500,0000. of coin, &c., shipped to and fro had very little to do in the way of payments for produce received. Yet certainly the produce was paid for in something. Financial readers perhaps will fully explain. The thousands of millions yearly transactions of the London Bankers' Clearing-House, without a coin scarcely passing, is one of the most marvellous facts of the world. It never had its equal, and never can have a superior anywhere, and shows that extraneous dealings with coin are, comparatively, trifling in amount.

Just now there appears to be a generating state of trade depression; and there are not wanting those who are loud and long in their wail that the country is fast "going to the dogs," as if they half wished it so to be. Hardly anybody seems to take into fair account the vast extent of our foreign trading. It may be that a million is nearly an incomprehensible expression. "The king in his parlour counting of his money" never got so far as that; and, most likely in coin, nobody else. In fact, money itself seems to have had a good deal too much court paid to it; for it does not do a thousandth part of the work attributed to it. Credit and stationery do the most of the work at the hands of financiers, big and little. The "money market," as it is called, is held in differences of opinion, even in high quarters. One affirms, another denies; and the modifications of affirmations and denials only help to hinder unfinancial minds in their calculations and inferences. A sudden rise in the Bank rate does not always bring sharply the expected supply of bullion to that highly respectable "Old Lady" in Threadneedle-street.

It never seemed quite clear why it should have this effect in any very marked degree. People at home, as a rule, do not keep gold in their possession beyond their immediate requirements. The rule perhaps is they have little or none elsewhere. The very highest per cent. does not always attract even surplus into the Bank vaults, and the cost of transit, and insurance of large sums from abroad have to be set against the differences of rates of exchange to show a resultant profit worth the bother. Mr. Thomson Hankey, cradled in the mysteries of money, was not so very long regarded as a heretic in the matter, and was caddled accordingly by other authorities equally high in monetary circles, but who can help thinking that the export of gold is any part of the real business of the Bank, and that there are other "stores" of gold available for that purpose. It appears not at all dimly that the Bank's stock of bullion is the central safe of the dealers in money more than anything else; the depository of securities against necessities and surprises, or for the matter of that a "panic."

The natural or artificial history of the panic of 1866 has never been written, and possibly never can be. The power of one man by himself is not very much, but the power of one man in a crowd may be immense. The power of one man in a mob is well known. In a crowded theatre the cry of "fire" from one of the audience will create a panic quite appalling; and the cry of "crisis" within a mile radius of the Bank of England can be made by the interested quite sufficient to create a crisis. Men depend so much upon one another, and so little upon themselves, that if A, B, and C start off at a tangent it is most likely that the rest of the alphabet will blindly follow the leaders, like mountain sheep, and almost as silly. This is not hyperbole. Keeping the eyes fixed constantly on a small object will partially or wholly destroy the visual power for viewing a large one,

appropriately. Although it may be almost heterodox and disrespectful to say it, but it must come—the Bank balance of bullion is one of these small objects (most respectable in its way, no doubt), and there are thousands of knowing persons who wisely look weekly at the 20 millions or upwards, and are elevated or depressed, just as the bulk expands, or contracts. These disordered affections become chronic, and in the end unman the men so afflicted.

An invalid of this sort, depressed in this way, recently got cured by being forcibly dragged out of himself to revel in the sight of the "Birds in their Homes," in the Museum at South Kensington. Others, perhaps, might likewise benefit. Returning to the Bank, it is more than half amusing every year to witness how grudgingly Londoners look upon the periodic withdrawals of coin for harvest and other purposes, showing as little common sense in their conduct as if the same kind of regret went after each passenger-train from St. Pancras, northward, lest London should be depopulated. Mr. Hankey appears to have been exactly in the right as to the export or non-export of bullion being no business of the Bank's.

People are apt to measure the "till of the country" by their own till, and to take their cue from local bank managers, who are apt to take the stereotyped "Reuter" for absolute gospel, and when once distrust is engendered there is no contagion that spreads so rapidly, or with such discomforting effects. The human face divine instantly becomes of a fiddle pattern; down goes the physical thermometer, and the whole digestive system gets out of order. Thus a man becomes a panic-monger without knowing it, and goes in with the rush, often to the derangement of his own common-sense, and of his exchequer, too. A panic-monger is a worm that will never die, if he can help it; and, unlike a mad dog in one respect, nobody tries to dispatch him quickly. The unused Bank balance of bullion appears to be unearning respectability, and little more. The Bank can, under no circumstances pay gold for all its notes issued. It is not essential that it should. A bank note is a very respectable legal tender, and will continue so to the end of the chapter.

More than a moiety of the holders of bank notes, so long as they are a legal tender, would rather not have gold in their place; it ought to, and is enough then, that the holders who do want gold should be able to get it on the instant they want it. This they can do. Some of the expressions of existing discontent appear beneath contempt. A good deal of grievance has arisen from the Limited Liabilities Act, but it may be fairly asked where would our immense industries have been without them? It is not at all improbable that, but for them, this country would have lost her standpoint amongst the nations by this time, and instead of furnishing 320 millions sterling worth of articles of almost every kind beyond her own requirements to the rest of the world, and bringing home profitable produce in return, she would have been writhing in the painful bonds of half-pay and half-food, with the grim ghosts of revolution and spoliation in the background. But now, with fewer poor and incapables than ever—with next to no able-bodied labour out of employment; and almost too few skilled hands to execute the universal orders upon her extraordinary workshops—all her industrious people are fed, clothed, housed, and yet there are people of mark unwise enough to say (whether they think it or not) that the country is "going to the dogs," and certain trade journals, forsooth, "take up the wondrous tale." The notion is cruelly absurd. If this country gains hundreds of millions by her trading, the country—that is, the trading part of the country—is by so much the richer; and surely, if those who help to raise the raw materials out of underground properties, and those who melt and hammer them into shape, do get more money for their labour the country—that is, the living people in it, in the greatest number are being benefited in a great degree. The surface arrangements in the matter of agriculture, perhaps, go for less and less value every year, exactly in proportion as the surface loses its power of supplying from itself the corn and the cloth required by its teeming population.

Lamentation over the latter fact is all waste agitation, for the area of this nice little, tight little island, cannot at present, at all events, be stretched by the application of any known engineering or agricultural skill, and that command to the first parents of mankind to increase and multiply does not seem at all likely to be reluctantly obeyed. Part of the above was written sometime ago, but applying equally now it is reproduced.

London, Jan. 31.

T. A. READWIN, F.G.S.

GOLD AMALGAMATION.

SIR.—Having read several letters in the *Mining Journal* with the above heading, and being very much interested in the subject of the amalgamation of gold and silver, I have made careful enquiries concerning the new patent wave-plate amalgamator, which have resulted in facts of such an extraordinary nature being brought to my knowledge that I think it will be of very great interest to your readers to state what they are as briefly as possible. I must first tell you that I have made several visits to the Southern States of North America, and have become pretty well acquainted with the character and various classes of minerals which predominate in North Carolina. I find that the most common ores are sulphides of iron and copper, nearly always auriferous, also the sulphides of lead and zinc, which are generally more or less rich in silver. I find that at or near the surface the ores are oxidised, but that on reaching water level the sulphides of either metal are only found. I specially visited the Conrad Hill Gold and Copper Mines, these being among the foremost and most actively-worked group in North Carolina, and became acquainted with the managing and other directors, who kindly allowed me to inspect their works both above and under ground. I found a very promising mine, thoroughly well equipped with all modern appliances, and a most enterprising and practical manager at the head of affairs. This gentleman had only just returned from a prolonged tour of inspection abroad, where he had visited some of the most celebrated mines, with the sole object, so he told me, of acquiring the benefit of other people's experience as regarded the treatment of so-called refractory ores, such as he had to treat at Conrad Hill. Immediately on his return he selected the most economical and efficient mechanical contrivances which appeared available for the treatment of his ores, some of which were still in course of erection when I left there last spring. Since my return to England I have been informed that Mr. Moon has patented his wave-plate amalgamator, and that in the presence of several mining men a series of trials with his amalgamator were commenced at the Conrad Hill Mines last September; the result was astounding. I have it on good disinterested authority, and I believe it to be a fact, that over 60 per cent. more gold was saved by Mr. Moon's amalgamator than by the plates, pans, and other contrivances in use at the Conrad Hill Mines; that although 40 per cent. more ore was treated per diem in Mr. Moon's amalgamator than he claims should be put through it the loss of gold was nil, as proved by assays made of the tailings. But this is not all, for, as Mr. Readwin justly says, "it is the best process which gets the most gold at the least cost in the least time." The patent wave-plate amalgamator is automatic, requires no attention other than to oil certain bearings, and occasionally clean up the amalgam. Again, the expense of running this amalgamation is I believe lower than any other in existence, a horse power will suffice to run a machine that will treat 20 tons of crushed ore per diem, add to this a few pence for oil, and there is the total expense, wear and tear of course excepted. I believe it to be a fact that no amalgamator has ever done such work, and I am convinced that it will be a very long time before anything cheaper and more efficient will be devised.

I believe the saving at the Conrad Hill Mines amounts to nearly 35000. per machine per annum. I fancy that Mr. Moon requires no advertising, for his name will soon be pretty well known all over the world. I think that having accomplished such wonderful results Mr. Moon may be excused any exuberance of spirits. It must be borne in mind that the ores at Conrad Hill Mines are refractory, and that no money or pains had been spared to procure the best modern machinery and appliances, so that these trials, which were conducted in the presence of several mining men, were most severe, and seem to any ordinary mind conclusive. I cannot give exact figures as to the amount of ore already put through these machines at Conrad Hill, but it certainly exceeds 1000 tons, and they are running and have run constantly without any hitch or mishap ever

since being started. This is surely satisfactory and practical, and no mere laboratory experimenting. One other important point is that no matter how fine the gold may be, or whether or no it floats on the water, it is all saved by Moon's amalgamator. The following extracts from letters in my possession from mining men who are quite competent judges, and who were among those present at the trials at Conrad Hill Mines, North Carolina, will, I think, confirm my views. Mr. J. T. Muffy, general manager of the Cid Copper Company, writes from the Cid Copper Mines, Cid P.O., Davidson County, N.C., on Oct. 23, 1883:—"After a careful study of the wave-plate amalgamator, and witnessing its operation at the Conrad Hill Mines, I am pleased to express my opinion of its worth. For durability, simplicity, and minimum need of motive power it certainly has no equal in any other amalgamator now in use." "By the particular motion of the apparatus gold, that may be corroded or oxidised with other metals or baser substances, is retained by the volume of mercury until by attrition it is freed from corrosion, and like fine gold forms a part of the amalgam. There is no sickening of the mercury, no alloy of copper as with the plates, no constant care or danger of losing gold and washing quicksilver by careless or incompetent employees. The greater portion of the mines in the Southern States are fissure veins mainly composed of gold-bearing pyritic ores, and many chemists of great ability admit that repeated assays in the ordinary way do not give uniform results. I believe this amalgamator will not only accomplish this, but will also show the ores richer." "An old authority on metallurgy says a single grain of gold can be divided into eighty millions of millions of divisible parts. This surely must be the fine gold of our southern pyritic ores on which fortunes and years of experimenting have been spent to discover a process for successful treatment. He has (Mr. Moon) I feel confident solved the problem, and placed the south in a position to increase her yield of the royal metal more than a thousandfold."

The general manager of the Conrad Hill Mines writes:—"From our present experience I consider Mr. Moon's amalgamator, for simplicity of construction, regularity of work, and results obtained, as the most efficient and economical amalgamator of which I have any knowledge." Being in possession of these facts I feel it my duty towards my neighbour to send them on to you, as the last letter I read in the Journal of Jan. 26 on this subject, written by Mr. T. A. Readwin, might, I think, create an erroneous impression among a numerous class of miners and those interested in mining operations, who are readers of your paper, and Mr. Moon cannot possibly answer Mr. Readwin for some weeks owing to his absence from England. I feel quite sure that Mr. Readwin, as he says, will be one of the first to congratulate Mr. Moon. M. PARRY GOSSET, F.C.S. Old Broad-street, Jan. 30.

CHECKS ON MINING SPECULATION.

SIR,—Having read the letter by Mr. R. Symons in last week's *Mining Journal*, I shall be much obliged if you will allow me to say that I fancy 18 out of every 20 persons who are connected with mining, and wishing it to prosper, will agree with Mr. R. Symons that these 40,000L premiums have checked mining to a very great extent; and if these large sums are continued to be charged it will stop the public from joining in Cornish mining. Wheel Elizabeth and Great Wheel Polgoth may be worth working. If so, what premiums should be charged. Is it true this latter mine paid 420,000L and the former 20,000L in dividends. South Terras: I do not think this mine will pay dividends on copper ore.

Mr. Symons speaks truly—there has been a good deal said about New Terras. The returns may satisfy the shareholders shortly. I hope so; if not, it will be another nail in the coffin of mining. My advice is, make haste and sell a few thousands worth of the 1,500,000L of tin said to be in the sett. The St. Stephen's Mines and Mining: Those who are most interested in these mines should establish some good mines before comparing it with Camborne or any mining district. These remarks apply also to Roche. * * * It would be far better to allow these and all other mines to tell their own tales on their own merits. All future promoters of mines, in my opinion, whoever they may be offering mines at extravagant premiums, should be denounced by all those who desire to see mining carried out in a legitimate manner. HENRY H. HESTER. Plymouth, Jan. 30.

CONTINUOUS JIGGING AT WHEEL JANE.

SIR,—It is a fact that the readjustment of the tariffs on foreign mineral and the question of lords' dues are two very important items in connection with mining. Unless the lords of English mines awake to the situation and assist mine adventurers the question of dues will eventually settle itself by the mines ceasing to work. The sympathy of the lords will come too late when their properties are idle and they will only have themselves to blame for killing the "goose." But the question of reducing the murderous dressing cost of tin mines can immediately be remedied—that is, if it is thought worthy of the consideration of those in a position to do so. That such a thing is necessary must be patent to the dullest intellect from the fact that the dressing cost is 25 per cent. of the monthly cost of the mines, and even more. An average of the total monthly labour cost at Wheel Jane, by the old process, was 600L; stamped, 1360 tons (three months) realised 12 tons 2 cwt. of tin at a cost of 130L. Since introduction of new process the total labour cost last month was 450L; stamped, 1850 tons (three months) realised 14 tons of tin at a cost of 50L.

Following is a succinct description of Southey's system of dressing now in operation at Wheel Jane, and open to the inspection of the civilised public:—The launder receives the tinstone from the shaft, and trams it direct to the stone breaker which is situated between the two whim shafts on the slope of the hill, on the point of a V formed by the tramroads from both shafts. The tinstone is tipped on to a screen, the fine falling through deposits itself into a shoot or hopper, from whence it is trammed direct to the stamps. The large stones escaping the screen are received into the jaws of the stone breaker, reduced to a proper size, fall into a wagon, and also trammed direct to the stamps. No shovelling is required from the shaft to the stamps. The stone breaker is sufficiently powerful to break stones as large as the skip will take—12 in. by 20 in. The work is then stamped in the ordinary way, and upon leaving the stamps grate flows into a cistern. No. 1 (the rough) is raised from here by a wheel classifier into a launder which conveys it to the jigger. No. 2 (second size) is also lifted by the same agency and conveyed to the jigger, and No. 3, which is the slimes, goes off to the frames whilst in solution (a very important point in connection with tin slimes). Nos. 1 and 2 when lifted by the classifier, in their course to the jiggers, are brought into contact with a pressure of water, a very ingenious contrivance which throws off any slime they may contain. Nos. 1 and 2 enter separate jiggers. The jiggers are worked by a small engine, 9 in. cylinder. The tinstuff (white) after passing through a copper bottom is fit for the calciner, and trammed direct to it. The cost to this stage in the dressing is, as I have previously stated, 6d. per ton. When Capt. Southey has completed his plans—i.e., erected a jigger on the burning house floors to receive the tin direct from the calciner—I take it that the cost of tin dressing by his process will be reduced to a minimum, and the least that can be done by those interested in tin mining is to present Capt. Southey with a suitable testimonial as a public acknowledgment of the valuable service he has rendered to the staple industry of the county, and as a just appreciation of his genius as a miner.

The secret of continuous jigging is classifying the stuff after it leaves the stamps or crushing mill. This, too, is the opinion of Mr. Green, of Aberystwith, a gentleman who has spent a lifetime in perfecting this class of machinery, which, when used fairly, is applicable to all kinds of ores. Capt. Southey's opinion on the point of classification is similar, and in fact all those who have adopted the machinery. The very fact of the effectiveness of continuous jigging beyond every other process in dressing all kinds of ores, when properly managed, independent of its immense saving in labour costs stamps it as the machinery of the future for such work in spite of prejudice or any other obstacle. It is a pronounced success in dressing foreign tin, and quite as much so at Wheel Jane, the tin from which mine Capt. Southey affirms is as difficult to dress as any

in the county—surely the Devil is not in Cornish tin? If so the sooner his Satanic Majesty is jiggered out the better. Sulphur and prejudice are both bad things to deal with, but the latter is by far the worst. As a proof of the confidence Capt. Southey has in his system, he is eager to take all the halvans at Tincroft and Carn Brea at 15s. in 1L. The adventurers in these mines might do worse than accept this splendid offer. W. NINESSE. Perranporth, Jan. 29.

OWEN VEAN AND TREGURTHA MINES.

SIR,—I was much interested on reading in the *Mining Journal* of last week the article on these mines by "Victor." There is, however, one important fact which may have been withheld from him by one who, whilst inflated with his own pomposity and imaginary knowledge of mining, ignores the credit which is fairly due to others. I have been credibly informed that Capt. Wm. Hancock, of Liskeard, first applied for the licenses and introduced these mines to the present company. In confirmation of this, it was stated by one of the lords at the starting of the engine, that had it not been for him (Capt. Hancock) they would not have been there that day. FAIR PLAY.

SHROPSHIRE LEAD MINES.

SIR,—The old Snailbeach Mine has evidently better days before it than some of the late days. Evidently the deepest parts of it have entered a richer floor or course of ground than the two or three lengths above, and when this richer ground is fully developed the old rate of returns may be known again. This company has gone to a heavy expense in the last two or three years in purchasing and fixing an expensive plant for boring purposes. It is always the best way when doing these things to do them well; but in the time of low prices for the mineral raised, was, we think, not the best time to do, and no doubt the company who have been accustomed to pick up handsome dividends for many years do not like to find the balance on the other side. However, they have a fine mine, and a large track of mineral ground included in their sett sufficient for three or four mines, and likely enough to make good mines if developed.

The bottom of old Tankerville also is looking better than it has for years past, the matrix of the lode resembling what they had some years ago with the splendid deposits of lead ore. This range of mines is likely to prove all and more than was expected when the present company was floated. We hear that the lead-bearing strata has been pierced to the bottom of the new shaft at Roman Gravel boundary; if so it has been struck sooner than was anticipated in the prospectus. MINER.

HOW PUBLIC COMPANIES SHOULD BE FORMED.

SIR,—The way in which hundreds of Limited Liability companies have during the last few years been launched only to terminate in a few months or in a year or two in liquidation and total loss of all money subscribed is, as observed in a leading article of the *Standard* of Jan. 9, "a public scandal." The hard savings of hundreds of poor struggling investors, widows, orphans, clergymen, &c., anxious to increase their small incomes, have thus been conveyed (convey the wise call it) into the pockets of vendors, promoters, accountants, liquidators, &c., as well as professional wreckers, and this very often because the capital actually and bona fide subscribed has been too little for the working expenses of the company after the payment of extortionate vendors' claims, loading by promoters, &c. The recurrence of such calamities would be prevented, as regards all future companies, if all applicants for shares would add to the usual out-dried form of application some such saving clause as the following:—"I make this request, payment, and agreement on the understanding that if before the expiration of six weeks from this date the shares bona fide subscribed for by the general public (i.e., not including vendors' shares, founders' shares, or shares of vendors' nominees), and on which shares so bona fide subscribed for the deposit has been duly paid to the company's bankers are not sufficient in number to provide at least the sum of £1 required for the proper working of the company [after payment of the sum of £1 payable in cash or shares to the vendors], no allotment of shares shall be made to me, but this application on my part shall be null and void, and the amount now paid by me shall be immediately repayable to me by the company free from any deduction."—Jan. 26. D. D.

MINERAL WEALTH OF MEXICO—CERRA DE PROANA MINES.—No. II.

Of even more general interest than the data as to the Proaña Mines, which this Fresnillo memoir provides, are the metallurgical notices, and the statistics of work done in the great Hacienda Nueva, the typical establishment for the treatment of silver ores by the patio. It seems that long ago the surface chlorides were amalgamated in copper vessels by a method known as beneficio de caza. On the resumption of work in 1830 the base metal ores were smelted; a small quantity of chloride was still subjected to the beneficio de caza; but 95 per cent. was treated by the patio at three small establishments near Fresnillo, and at others near Zacatecas. But no statistics of cost are preserved. Between 1831 and 1844, however, was erected the great Hacienda Nueva, at a cost of \$340,132.

It was during this period that Dupont wrote his work on the production of the precious metals in Mexico, which gives plans of the new Fresnillo works, and a full description of the treatment. In Dupont's day, however the stamps and arrastras were worked by mule-power. Subsequently the 60-inch cylinder engines, when replaced at the mine by the 80-inch, were transferred to the hacienda. This large establishment, whose patio can hold 64 tortas of 120,000 pounds of ore each, or 3840 tons, is the largest of its kind in the world. Yet of average mixture of oxidised and rebellious ores it could treat only 900 tons weekly. Herein lies the disadvantage of the method. The first cost is vastly greater than that of a mill on the Washoe process, and the ground occupied incomparably more. The establishment does not treat more than would a 50-stamp silver mill, and yet it covers an area of 900 ft. by 900 ft. The plant consists of two 60-inch cylinder engines, 314 arrastras, 12 stamp mills, pump-washers and sluices, magistral furnaces, and stables for 1500 animals—all surrounding the court or patio, in which, as above stated, 64 tortas, 15 yards in diameter each, can be treated at the same time.

The theory of the patio has always been a vexed question. It depends, of course, on the action of the chlorides of copper, whatever that action may be, on certain silver compounds, fitting them for the attack of mercury. The same reactions are taken advantage of when salt and bluestone are added to the pans in the Washoe process, and the Kröhnke method, used so successfully in Chili, is based upon them. The advantages of the patio are that, the grinding once effected, no mechanical power is consumed, and that no furnace treatment, and, therefore, no fuel, is required. The disadvantages are the length of time consumed in the operation and the great expenditure of animal force. In the small way, a ratio plant can be extemporised at little outlay; and where fuel is scarce and animals plenty, and the climate sufficiently temperate, probably no method can compete with it. The results are as close as or closer than are obtained on similar ore by our hasty methods of amalgamation. The question, therefore, presents itself, whether, by employing good machinery and kneading the patio by some mechanical appliance instead of the feet of animals, a perfect extraction could not be effected, time saved, and expenses in some cases lessened.

The operations are—1. The coarse crushing, which is at Fresnillo, as elsewhere, effected by stamp-mills even more primitive than those still to be seen in Cornwall and Germany, with wooden stems and clumsy iron shoes. 2. The pulverisation. The coarse sand from the battery is reduced to pulp in the arrastra, a basin whose bottom and rim are constructed of large stones, in which another large stone is dragged around by mule-power. The produce of an arrastra is from 600 to 1500 lbs. per day, according to hardness of material and fineness of grinding. At Fresnillo very fine grinding is not preferred, and the yield at each arrastra is about $\frac{1}{2}$ ton. As great a disparity as exists between a Mexican and a Californian stamp battery divides the Mexican arrastra from the grinding-mill used at Escobar and

Orma's great silver establishment in Chili. The pulverisation is effected by the same mechanical elements, applied in the same way; but the whole structure is of iron, the parts are perfectly adjusted, the feed and discharge are automatic, and the pulp remarkably fine and even. 3. The pulp, as received from the arrastra, is partially drained in slime pits; and, 4. But it is still semi-fluid when thrown on the floor of the patio in quantities at Fresnillo of 60 tons, and is prevented from spreading by a temporary barrier of timbers and manure. Thus it is left until evaporation has reduced it to such consistency that it can be still easily penetrated by the feet of the animals.

The metallurgical treatment consists—(a) Of the addition of salt, 24 per cent. by weight of the torta, after which the mass is turned over by shovels and trodden by from eight to 15 horses or mules. These are tied to and revolve around a stake which forms the centre of the torta. (b) Sometimes with the salt—more generally 24 hours afterwards—from 1 to 2 per cent. of magistral, roasted cupriferos pyrites—is incorporated with the mass. In certain localities bluestone in proportionate quantities replaces the roasted ore. (c) The gradual addition of the mercury now begins, and the skill of the azogueros (mercury men) is called into play. He watches the progress of the amalgamation, adding magistral when it lags and mercury when the consistency of the amalgam indicates; and he kneads the pulp with the troop of horses oftener or less frequently as his judgment dictates. During the winter months, especially at Fresnillo, when the surface of the tortas freezes at night, peculiar complications supervene which tax his skill. Dupont well describes the indications which guide the azogueros when he says:—"Without pretending to isolate the examination of the different parts of the tentadura tests, one may say that the colour of the mercury is the guide for the proportion of the magistral, the condition of the limadura (the flowering and granulated mercury) indicates the daily progress, and the greater or less degree of solidity in the amalgam determines the addition of more mercury and the end of the operation."

The amalgamation completed, the ore passes to the washers, and the amalgam is retorted. The time occupied varies from 15 days in summer on free ores to 30 or 40 days when the season is cold or the ore base; but the note to page 35 gives the result of Henry Macintosh's investigation at the Hacienda del Salto on the accelerated effect of continued motion: "Two tortas of the same weight and the same mixture of ore were spread at the same time upon the patio. One of them worked with eight repasos of five or six hours each, at intervals of three or four days, required 27 days. The other one, worked by causing the same number of mules employed in the repasos of the first one to travel over it uninterruptedly day and night, was finished in 80 hours. The yield of silver and the loss of mercury in the two cases were sensibly the same. But the cost of the repasos being very high at Guadalupe y Calvo, a double quantity of work for the mules in order to gain time was not profitable. When watching the animals plodding through the pulp it must occur to everyone that where steam-power is as cheap as animal power, or where water-power is available, the work would be better done by a machine like a great chocolate-mill, whose rollers would be provided with large teeth.

Such in outline is the patio process. The first statistical exhibits from 1835 to 1844 are given in general terms only. In that period \$2,261,875 worth of reagents were employed, in the reduction of which quicksilver at the average cost of \$1.33 per pound was used, and cost \$2,128,000; magistral cost, \$292,500; salt, \$841,375; total, \$3,261,875. The average loss and consumption of mercury declined to 10½ ozs. per mark of silver, and the cost of production fell toward the end of that period to \$9.75 per ton, exclusive of mercury. The results, materials consumed, and cost of beneficiation at Proaña for the next period—from 1853 to 1862, as tabulated in the memoir, are exact and worthy of study. The totals are as follows:—

Ore worked, tons	452,264.80
Silver produced, marks	1,096,281.32
Value of silver	\$9,825,595.68
Salt consumed, carboys	186,229
Or 123 pounds per ton = 6 per cent.	
Magistral consumed	7,922 tons, or 35 pounds per ton = 175 per cent.
Quicksilver	904,306 pounds,
or 19 pounds per ton of ore treated,	
or 13.197 ozs. per mark.	
or 0.87 ozs. per \$1 worth of silver recovered.	
Average yield	2,424 marks,
or \$21.74 per ton.	
Average difference between yield and assay value	Per cent.
Highest difference	13.450
Lowest	24.000
Cost of treatment	10.435
	\$5,051,769.66
	or \$11.169 per ton

During that period the deepest ores were treated—ores so base that they would have yielded so imperfectly to pan amalgamation that our millmen would have subjected them to a preparatory chloridising roast. They consequently consumed more chemicals and more labour in their treatment than if they had been oxidised by Nature; for, whether decomposition of a base ore takes place rapidly in the furnace or slowly in the patio, reagents to effect the decomposition must be consumed, and labour to bring these reagents into contact with the ore and with one another must be expended. Considering that the cost of the articles consumed, taken from a price-list of supplies in 1844, was as follows:—Salt, \$10 per ton; magistral, \$50 per ton; quicksilver, \$1.20 per pound; wood, \$22.50 per ton; and that all kinds of ironware and supplies were inordinately dear, it must be admitted that the patio process is not an uneconomical method, when it can treat a base ore under these conditions for \$11.16 per ton, and not an insufficient one when it extracts 80 per cent. of its silver value from such refractory material. It would surely be worth while for our metallurgists in Mexico to consider whether the method cannot be so modified that its defects will be remedied, while its advantages are retained.

TESTIMONIAL TO MR. P. L. SIMMONDS.—On Monday evening a banquet was held at the Holborn Restaurant, when a presentation was made to Mr. P. L. Simmonds, in recognition of his valuable services as British Commissioner at the Amsterdam Exhibition. The chair was occupied by Mr. Alderman De Keyser, who was supported by Sir W. Ellis, Messrs. Rimmel, Brinsmead, Pryce-Jones, W. B. Treloar, Eduljee Pestonjee, J. C. Chubb, T. Bond, Hyde Clarke, and other gentlemen. After the banquet the Chairman presented Mr. Simmonds with a cheque for 650L, subscribed for by many of the leading London and provincial firms, who were exhibitors at the recent exhibition. Mr. Simmonds, in responding, alluded to the many difficulties which beset the British exhibitors at the Amsterdam Exhibition, and congratulated them on the success which, in spite of those difficulties, they had achieved, and thanked them for the kind and appreciative manner in which his endeavours to superintend the English exhibits had been met. During the evening a selection of music was performed under the direction of Mr. W. Coates.

DINNER TO PROFESSOR OWEN.—The retirement of Sir Richard Owen, K.C.B., F.R.S., from the office of superintendent of natural history in the British Museum was commemorated by a complimentary dinner given him by his colleagues, about 70 of whom, including most of the keepers of the South Kensington and Bloomsbury branches of the Museum, were present to do him honour. After the usual loyal toasts that were the Trustees of the Institution was given, in proposing which the Chairman (Mr. Edward A. Bond, LL.D., chief librarian) referred to the marked kindness which the Queen had shown to the Professor in her recognition of his talent and scientific work by inviting him to give instruction in science to the Royal Princes, and in recommending him to the trustees of the museum in the capacity of superintendent of the natural history department; in providing for his health and comfort by placing at his disposal a house in Richmond Park; and finally in conferring upon him the dignity of K.C.B. Dr. Bond also called the attention to the activity and interest taken by His Royal Highness the Prince of Wales, and His Royal Highness the Duke of Albany in the administration of the affairs of the museum. In regard to the trustees, Dr. Bond spoke of their disinterested services and of their being men of high position, with public duties to perform, who cheerfully made great sacrifices of time for the benefit of the national collections. His experience of them at their meetings during the five years of his tenure of office was, that they always made it their object to support the aims of the

officers of the institution, in whom they had every confidence. The toast of the evening—Professor Sir Richard Owen—was entrusted to Mr. William Carruthers, F.R.S., the keeper of the botanical department, who in proposing it referred to some of the chief incidents in the career of Professor Owen, and dwelt upon the scientific value of his discoveries, more especially in regard to the researches he had made in the field of paleontology, the great results of which are familiar to every one. Mr. Carruthers also alluded to the Professor's eminent services to the nation in obtaining adequate accommodation for its natural history collections, and to the value of his labours at the Royal College of Surgeons, and in connection with the Hunterian Museum; also to the many hundreds of thoughtful paleontological treatises he had already given to the world of science, and was still adding to without relaxation. Sir Richard Owen, having acknowledged in suitable terms the great compliment paid him, called upon Professor C. T. Newton, C.B., keeper of the Greek and Roman antiquities, who proposed the health of the old museum officers then present, with which toast he coupled the name of Professor Story-Maskelyne, M.P., formerly keeper of the mineralogical collections in the British Museum. The Chairman next gave the health of Dr. Henry Woodward, F.R.S., keeper of the geological department, who had organised the dinner, and who bore testimony to the fruitfulness of research in the science he represented under Professor Owen, and to the progress paleontology must now make favoured by the ample accommodation recently provided by the Government in the new abode of the science. The health of the Chairman having been proposed by Dr. A. Günther, and drunk with enthusiasm, the evening's very pleasant proceedings were brought to a close.

ANTHROPOLOGY.—A course of six lectures "On Primitive Man" was commenced on Jan. 22, at South Place Institute, Finsbury, by Mr. Sydney Skerthly, F.G.S., M.A.I., the subject being "Flint and its Connection with Man's History." Commencing with the geological history of flint the lecturer pointed out that implements, or worked flints, had a much wider range than the natural stone. The value of flint lies in its hardness, and its homogeneity which cause it to possess a remarkable fracture. This was illustrated by flaking flint not only with the steel hammer of a flint knapper, but also with a pebble hammerstone of prehistoric age. The peculiarities which mark hand-worked flints from natural fractures was described and illustrated with specimens. The two great classes of stone implements were described and shown, together with their uses, and a knife and rough tool were made of flint. The modes of working flint by savages was discussed. Then the use of flint as a means of obtaining fire was described, and ancient and modern strike-a-lights exhibited, together with an old tinder-box with all its appliances of tinder, steel, and sulphur matches. At first pyrites took the place of steel, and this was continued even in some old guns. The modern gun-flint is only a modified strike-a-light as was shown by a large series of specimens. Gun-flints are still made at Brandon, and the lecturer showed that flint had been worked there from prehistoric times, that the modern flint-mines are a development of the old mode of mining, that the modern flint-diggers' pick is only a copy of the old deerhorn pick, and the flint-knappers' hammers are steel copies of stone tools. Flint-lock guns are still in use in cold countries like Siberia, and are likely to be superseded by breech-loaders, without cap guns having ever been adopted.

—Mr. Skerthly's lecture on Tuesday was upon the Two Stone Ages. Much misapprehension had arisen even in high places respecting the newer and older stone ages, it being thought by many that they represented in Britain two stages of development merging into each other as the prehistoric merged into the historic epoch. This is not the case, for there is a great break, like a geological unconformity, between the two, a gap which all evidence, geological, zoological, and archaeological, tends to widen rather than to bridge. The neolithic people were the direct precursors of the present inhabitants; their remains are found entirely in the most recent beds, associated with the remains of existing species, and show a considerable advance in agriculture; they are essentially prehistoric. The paleolithic remains, on the other hand, occur in older beds belonging to different physical conditions, are associated with remains of extinct animals, such as the cave-lion and mammoth, and belong to a people still in the lowest or hunting stage of development. The peculiar distribution of these remains was pointed out, and the reasons given which have led the lecturer to believe that the great gap or break in human succession was due to the glacial epoch.

INSTITUTION OF MECHANICAL ENGINEERS.—At the meeting on Jan. 24 (Mr. Percy G. B. Westmacott, President, in the chair) the secretary read the annual report, from which it appeared that at the end of 1883 the number of names of all classes on the roll of the institution was 1440, as compared with 1370 at the corresponding period of the previous year. There had been lost by death 22 members, and by resignation 21. The receipts for the year had been 4690*l.* 1*s.* 5*d.*, while the expenditure had been 4196*l.* 12*s.* 3*d.*, showing a balance of receipts over expenditure of 493*l.* 9*s.* 2*d.* The total investments and other assets amounted to 15,050*l.*, and as the liabilities were nil, that was the capital of the institution. The council had determined on a re-arrangement of the personnel of the staff which would result in a considerable reduction in the annual expenditure. As it involved the retirement of the assistant secretary, the council proposed to mark their sense of that gentleman's 28 years' services by presenting him with an honorarium of 1000*l.* The President, in moving the acceptance of the report, referred to the loss the institution had sustained by the death of Sir William Siemens. Mr. E. A. Cowper seconded the adoption of the report. Mr. Adamson moved as an amendment, that the action of the council in the matter of the reorganisation of the staff should not be approved of. Mr. Wise seconded the amendment, and a lengthy discussion ensued. Mr. E. H. Carbutt, M.P., proposed that that portion of the report which related to the dismissal of an officer and the reorganisation of the staff should be referred back to the council for reconsideration. After two hours' discussion Mr. Carbutt's resolution was adopted almost unanimously. The Chairman then put the motion for the acceptance of the report, which was agreed to, after which the secretary announced the result of the election of officers for the ensuing year. Mr. I. Lowthian Bell, F.R.S., has been elected president for the ensuing year.

At Friday evening's meeting an interesting paper on novel researches and observations on the Physical Condition of Iron and Steel was read by Prof. D. E. Hughes, F.R.S. In a paper on the molecular rigidity of tempered steel contributed to the institution last year, he advanced the theory that the molecules of soft iron were comparatively free as regards motion among themselves, while in hard iron or steel they were extremely rigid in their relative positions. He had since widened the field of research so as to embrace all the physical changes which occur in iron and steel through chemical alloys, mechanical compression or other strains, annealing, and tempering. By experiments he found that the following laws hold with every variety of iron and steel:—(1) The magnetic capacity is directly proportional to the softness or molecular freedom; (2) the resistance to a feeble external magnetising force is directly as the hardness or molecular rigidity. He had proved this to be the case with 60 different varieties of iron and steel furnished direct from the manufacturers, and he had found that each variety of iron or steel has fixed points beyond which annealing cannot soften or tempering harden. The instrument which Professor Hughes had constructed and used in his experiments, and which he has named the "Magnetic balance," was then described, after which Professor Hughes said he believed that he had shown reason to hope that they might eventually obtain, by uniting chemical with physical analysis, a more clear insight into the mysteries of iron and steel. Mechanical tests, as well as chemical analyses, had failed to find any distinct line of separation between the numerous varieties of iron and steel. The physical method he had employed showed clearly that there was no dividing line. Chemical analyses also failed to show a dividing line, as the same proportion of carbon was accompanied by very different results if sulphur, phosphorus, &c., were present. He had adopted the plan of simply reading an unknown piece of iron or steel in its annealed state; if the figure stood above 400° it was classed as iron, if below as mild or hard steel, according to its mag-

netic capacity. This happened to agree with the general classification at present in use and sufficed as a general division. Professor Hughes, at the request of the Chairman, then showed by placing a bar of iron in the magnetic balance with what ease its magnetic capacity might be determined, and in the case of any wire its homogeneity and other characteristics might be ascertained. In the discussion which followed, Professor Chandler Roberts pointed out some of the important results this simple and ingenious instrument was capable of giving in the hands of the practical metallurgist.

Meetings of Public Companies.

GLASGOW CARADON CONSOLS COPPER MINING COMPANY.

At the meeting of shareholders, to be held at Glasgow, on Monday, the accounts for the year ended Dec. 31 will be presented, showing a loss on the 12 months' working of 2026*l.* 8*s.* 6*d.*

The directors regret the unfavourable character of their report. They think it right, however, to explain to the shareholders that they do not consider this at all interferes with the expectations which have been expressed as to the ultimate results of the mine when further developed. On reference to the manager's report it will be seen that the loss on the year's working is thus accounted for:—In the first place he found that the hard bar of ground came down nearer the back of the 114 than he anticipated. The effect of this, as will be easily seen, was that he did not get his stopes carried up so far as he expected. In the second place, a considerable amount of outlay was required for doing work, as explained in his report, connected with sinking the shaft to deeper levels, and which will not again be necessary for a long time to come. In the third place, the exceedingly low price of copper which has ruled during the year, and which has not only made a difference of about 1000*l.* in the receipts, but has rendered it impossible to work profitably several parts of the mine, which it would have been possible to do with a higher price for the ore.

Looking to the future, however, the directors believe that things have a much lighter aspect. The lode in the bottom of the 114 gives evidence of the ore holding down in depth, and that when the 128 is reached there will be the full 12 fms. of backs in that level from which to stope the ore.

The directors, judging from the results of the past and by the practical advice they have been able to obtain, are most desirous to carry out in full the course so strongly urged by the manager—the sinking to the 128 and driving a cross-cut to intersect the other lodes known to exist in the property, and which were profitably worked at the shallower levels.

CAPE COPPER MINING COMPANY.

An extraordinary general meeting of shareholders was held at the Cannon-street Hotel on Wednesday, to appoint Messrs. John Taylor and Sons managers of the company, and to make some slight alterations in the Articles of Association.

Mr. E. A. PONTIFEX occupied the chair.

Mr. J. C. LEAVER (the secretary) read the notice calling the meeting.

The CHAIRMAN said that before commencing the business of the meeting he was sure the shareholders would not think it out of place if he expressed the great regret which he was sure they all felt at the event which had compelled the directors to call them together.

Mr. Richard Taylor had been known so long and so intimately to so many of those present that they felt his loss to be that of a personal and sincere friend, and his colleagues on the board were sensible that they had lost a very able and sagacious adviser. (Hear, hear.) It was exactly 21 years ago since the original directors of this company associated themselves with the firm of Messrs. John Taylor and Sons in the inception of this enterprise which had proved so prosperous. Of that band of original directors he regretted to say that his friend Mr. Bevan and himself were the sole survivors. Their friend Mr. Galsworthy was not an original director, although he was from the first the legal adviser of the vendors, and in that capacity he had a very great deal to do in bringing this company before the public. During the 21 years which had since passed the elected directors had worked most harmoniously and pleasantly, often under very anxious and trying circumstances, with the gentlemen who were appointed managers—Messrs. John and Richard Taylor—who were appointed under the Articles of Association, and under those Articles of Association they were only removable by vote at a general meeting. The position of the managers, indefinite as that term was, might have been one of some difficulty, and might often have occasioned a somewhat strained relation with the elected directors if gentlemen who were appointed in that capacity should entertain different views from the other directors who must possess some business aptitude and experience, otherwise they would not have received the honour of election by the shareholders. During all that time he did not mean to say that there had never been a difference of opinion upon the board, otherwise they would have been a mere cabinet of nonentities, but during that time the elected directors had worked harmoniously with the gentlemen who had been appointed managers of the company, and he thought it was in no slight degree due to that harmony of co-operation that the results had been as prosperous as they had been, and nothing had contributed more to that harmony than the amiable qualities which characterised Messrs. John and Richard Taylor, and the sound judgment and knowledge which they possessed. He thought it was a great deal to be said for a man who would have kept us in the path which had resulted in success. The directors were happy in the belief that their valued friends, Mr. John and Mr. Richard Taylor, whom they had so recently lost, had left behind worthy successors in the persons of Messrs. John Taylor and Richard Henegge Taylor; and the object of convening this meeting was to ask the shareholders to give expression to that belief by appointing those two gentlemen as managers in the place of their predecessors, their worthy and lamented fathers. It so happened that since the association they had never been a difference of opinion upon the board, otherwise they would have been a mere cabinet of nonentities, but during that time the elected directors had worked harmoniously with the gentlemen who had been appointed managers of the company, and he thought it was in no slight degree due to that harmony of co-operation that the results had been as prosperous as they had been, and nothing had contributed more to that harmony than the amiable qualities which characterised Messrs. John and Richard Taylor, and the sound judgment and knowledge which they possessed. He thought it was a great deal to be said for a man who would have kept us in the path which had resulted in success. 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CORK.—Messrs. J. H. CARROL and SONS, stock and share brokers South Mall (Jan. 31), write:—Great Southern were again done 120, and Wicklows at 61. Midlands strong, at 82½ to 83; on dividend, 3½ paid. No change in Bandons or Macrooms. National Banks were done at 24½ ex div., and Munsters at 67-16th. No change in Provincials or Hibernians. Alliance Gas remain 12, 12½.

and Cork Gas, 7½ to 7½. Lyons fully-paid shares were asked for at 6 9-16th, and Gouldings at 9. Leys were offered at 6½, and Brewery at 4. Lyons Debentures remain 102 to 102½, and Harbour Board, 101 to 101½.

SCOTCH MINING AND INDUSTRIAL COMPANIES SHARE MARKETS.

STIRLING.—Mr. J. GRANT MACLEAN, stockbroker and ironbroker (Jan. 31), writes:—During the past week the markets have been quiet, owing to the fortnightly settlement intervening, and the stormy state of the weather, which entirely interrupted telegraphic communication. There is no alteration in the position and prospects of trade.

In shares of coal, iron, and steel companies prices are steady. Ebbw Vale has improved to 6½; Llyfni and Tondur, 70s. to 75s. Marbella Iron have been sold from 66s. to 69s. West Cumberland about 73s.

In shares of foreign copper and lead concerns there is no particular change to notice. Tharsia have been sold from 64s. 6d. to 67s. 6d.; this stock is scarce, and commands a backward price. Arizona fell to 25s., but are now firmer. Bengel Baragunda, 11s. 3d. Belt offered. Copiapo, 60s. to 65s.; Pierrelitte, 14s. to 15s.

In shares of home mines business is still quiet. Glasgow Camdons have been sold at 4s. to 5s.; their report for the meeting on Feb. 4 states that the prospects are brighter, and it is hoped the small additional amount of capital required to bring the concern again into a remunerative position, will be supplied. East Van, 4s. to 5s.; East Wheel, 4s. to 5s.; Great Laxey, 10 to 10½; Goginan, 3s. 9d.; Gunnislake (Chiters), 2s. 6d. to 2s. 10d.; Killibroth, 18s. to 20s.; Mounts Bay, 2s. to 3s.; New Trumpet Consols, 20s. to 30s.; Old Shepherds, 3s. to 10s.; Pedu-an-dra, 2s.; Phoenix United, 17s.; St. Just, 40s. to 50s.; South Crofty, 16s. 3d.; Tamar, 3s. 3d. to 10s.; Treavean, 4s. to 5s.; Tregontrees, 1s. 3d. to 2s. 6d.; West Poldice, 6s.; West Beton, 22s. 6d.; Wheel Basset, 45s. to 55s.; Wheel Jane, 3s.; Wheel Pevor, 20s. to 25s.; and Wheel Ury, 16s. 3d.

In shares of gold and silver mines there has been more business doing. Richmond have improved to about 4½. United Mexicana also advanced to over 10½, but are now easier; this company's profits continue satisfactory. Chile Debentures wanted. Antioquia are at 2s. 6d. to 5s.; Asia Minor, 11s.; Alankoo, 7s. 6d. to 10s.; Birdseye Creek, 20s.; Chontales, 2s. 6d. to 3s. 9d.; Consolidated Silver, 1s. to 2s.; California, 10s. to 12s. 6d.; Gold Coast, 5s. to 7s. 6d.; Guinea Coast, 4s. 3d.; Indian Glenroth, 1s. 6d. to 2s. 6d.; Kapanga, 2s. to 3s.; Koh-nor, 6s. 6d.; La Plata, 5s. to 6s.; New Callao, 5s. 6d.; New Gold Run, 1s.; Olathe Silver, 1s. to 2s.; Rio Grande, A, 2s. 3d.; Victoria, 19s. 6d. to 15s. 6d.; and Victorian Ten per Cent. Bonds, offered.

In shares of miscellaneous companies prices are steady. Oil shares are now firm, owing to the improved prospects of trade and the continued decrease of production in America. Home Mines Trust, 10s. to 11s.; and Lawes' Chemicals, 5½ to 6.

EDINBURGH.—Messrs. THOS. MILLER AND SONS, stock and share brokers, Princes-street (Jan. 30), write:—In Scotch railway stock North British shows a fall from last week's price of about 10s., and Edinburgh and Glasgow is also lower. The other Scotch ordinary stocks are scarcely changed. The demand for preference and debenture stocks continues good. Union Bank of Scotland has receded 5s.; the other banks remain at the old prices. Dalmeny Oil, Lanark Oil, and Midlothian Oil shares are each rather lower. Arizona Copper shares have fallen on the statement made at the meeting, the lowest point touched having been 25s. against 32s. 6d. a week ago, the last price to-day was 23s. 6d. A large business has been done in these shares. North British and Mercantile Insurance shares have risen 2s. 6d., Assets share fell heavily on the result of the meeting touching 7½ against 8½ a week ago, but recovering a large portion of the fall. Mortgage of South Australia shares have receded 3d.; National Mortgage and Agency of New Zealand, 3d.; Northern Investment of New Zealand, 3d.; Scottish American Mortgage have risen 1s. Prairie Cattle shares are about 2s. 6d. better. Edinburgh Tramway shares have fallen heavily from 10½ to 9½.

UNITED STATES PRECIOUS METALS STATISTICS.

Subjoined is Messrs. WELLS, FARGO, and COMPANY'S annual statement of precious metals produced in the States and Territories west of the Missouri river (including British Columbia, and receipts by express from the west coast of Mexico) during 1883, which shows aggregate products as follows:—Gold, \$29,236,492; silver, \$47,229,649; copper, \$5,683,921; lead, \$5,163,550. Total gross result, \$90,313,612.

California shows a decrease in gold of \$1,629,028, and an increase of silver of \$969,844. Nevada shows a falling off of \$1,591,755. The Comstock shows an increase of \$392,468; but there is a decrease in the product of Eureka district of \$1,419,124. With the exception of Montana and Idaho, there is a decrease in the product of the other States and Territories.

The facilities afforded for the transportation of bullion, ores, and base metals, by the extension of railroads into the mining districts, increase the difficulty of verifying the reports of the products from several important localities; and the general tendency is to exaggeration when the actual values are not obtainable from authentic sources; but the aggregate result, as shown herein, we think may be relied on with reasonable confidence as approximately correct:—

States and Territories.	Gold dust and bullion by express.	Gold dust and bullion by other conveyances.	Silver bullion by express.	Ores and base bullion by freight.	Total.
California	\$13,182,138...	\$559,109...	\$1,171,749...	\$60,269...	\$15,673,314
Nevada	1,097,500...	—	5,924,252...	1,749,774...	\$7,771,526
Oregon	387,927...	193,863...	11,090...	—	\$592,980
Washington	42,117...	21,058...	351...	—	\$63,536
Alaska	50,000...	—	—	—	50,000
Idaho	1,077,985...	215,597...	692,545...	1,819,700...	\$3,805,827
Montana	2,380,000...	119,000...	4,900,000...	2,480,000...	\$9,879,000
Utah	27,036...	4,124...	2,398,827...	4,587,885...	\$7,017,682
Colorado	2,341,692...	—	4,434,444...	17,533,884...	\$24,310,000
New Mexico	123,642...	80,000...	1,190,577...	2,049,900...	\$3,413,519
Arizona	340,686...	150,000...	4,147,427...	3,545,630...	\$8,183,743
Dakota	2,448,000...	245,000...	130,000...	—	\$2,823,000
Mexico (West Coast)	767,636...	—	3,670,549...	304,000...	\$5,022,384
British Columbia	\$21,613...	130,400...	—	—	\$52,016
Total	\$24,823,217	\$1,808,234	\$28,872,609	\$34,810,022	\$90,313,612

The gross yield for 1883, shown above, segregated, is approximately as follows:—

Gold	22 36-100 per cent.	\$29,236,492
Silver	62 30-100 per cent.	47,229,649
Copper	8 30-100 per cent.	5,683,921
Lead	9 04-100 per cent.	5,163,550
Total		\$90,313,612

Annual products of lead, copper, silver, and gold in the States and Territories west of the Missouri river, 1873-1883:—

Year.	Products as reported by W. F. and deducting Co.'s state-ments, includ-ing amounts from British Colum-bia and West Coast of Mexico.	The net product of the States and Territories west of the Missouri river, exclusive of British Columbia and West Coast of Mexico, divided, is as follows:—	Gold.	Silver.	Copper.	Lead.
1870	\$54,000,000	\$52,150,000	\$1,000,000	—	—	—
1871	58,284,000	55,784,000	2,100,000	—	—	—
1872	62,236,959	60,351,824	2,250,000	—	—	—
1873	72,258,693	70,139,869	3,450,000	—	—	—
1874	74,461,045	71,965,810	3,800,000	—	—	—
1875	80,829,057	78,701,423	5,100,000	—	—	—
1876	96,575,173	94,219,858	5,540,000	—	—	—
1877	98,421,754	95,811,582	5,085,250	—	—	—
1878	81,154,622	78,276,167	3,452,000	—	—	—
1879	75,349,501	72,588,898	4,185,700	—	—	—
1880	80,167,936	77,232,512	5,742,380	—	—	—
1881	84,504,417	81,198,474	6,781,302	—	—	—
1882	92,411,835	89,307,549	8,098,158	—	—	—
1883	90,313,612	84,639,224	8,163,550	—	—	—

The exports of silver during the present year to Japan, China, India, the Straits, &c., have been as follows:—From Southampton, \$33,260,237; from Marseilles, \$851,840; from San Francisco, \$4,498,546. Total, \$38,610,623, as against \$43,266,000 in 1882.

ELECTRIC SUN LAMP AND POWER COMPANY.—In proposing the adoption of the directors' report at the meeting of this company on Jan. 23, the Chairman (Lord Brabourne) remarked that the progress of the electric light, and, therefore, of this company, had been materially affected by the stringent regulations of the Board of Trade. The novelty of the enterprise had also been adverse to its making greater progress, but he was convinced that as the advantages of the light became more fully known, there would be an increased demand for it. Having spoken of the merits of the lamp, and expressed his confidence in the future success of the company, he stated that the reason the present board proposed to retire in favour of the gentlemen whose names had been submitted to them was that the latter were able to give more time to the company, and they possessed considerable knowledge of the technical details of electric lighting. They also held one-half of the shares. The motion having been seconded, a discussion followed, and it was suggested that it would be for the interests of the shareholders for the company to go into voluntary liquidation. Other speakers, however,

were strongly opposed to such a course being taken. The Chairman said that even if the company went into liquidation the uncalled capital would be called up. He put the motion in the usual way, and declared it carried with two or three dissentients. Messrs. William Perkins, Henry de Grelle, and Paul Cremieu-Javal were afterwards elected the new board of the company.

THE INDUSTRIAL PROSPERITY OF IRELAND, AND HOW TO ENSURE IT.

BY SIR EDWARD SULLIVAN, BART.

Why is Ireland *magnas inter opes inops*? Why is a country super-eminently endowed with all those natural advantages that have elevated in their turn every people who have possessed them the only country—actually the only one in the world—that is sinking in the scale of nations? "For this Ireland," says Lord Bacon, "is endowed with so many dowries of Nature, considering the fruitfulness of the soil, the ports, the rivers, the fisheries, the quarries, the woods, and other material, especially the race and the generation of men, valiant, hard, and active, as it is not easy—no, not upon this continent—to find such confluence of commodities if the hand of man did join with the hand of Nature." Look at her now. Her millions of acres of waste but cultivatable land, her ruined commerce and manufactures, her houses uninhabited, her villages deserted; discontent, insubordination, insecurity, crime, stalking undisturbed through the country; her people foraging for work and wages, but idle, ragged, pauper-stricken; deriving a wretched existence from half-cultivated land; flying from their country like Lot from the cities of the plain. The condition of Ireland has no parallel in the world; she has a fertile soil, a genial climate, a redundancy of labour, but her land is not one-third cultivated. She has harbours, ports, rivers, coal, iron, quarries, and other minerals; but she has neither domestic industries nor foreign trade; she toils not, neither does she sow; she neither grows, nor works, nor buys—she goes without. We see a race of 5,000,000 or 6,000,000 of people, in no degree whatever inferior to the other races of mankind, who formerly stepped boldly along the great highway of progress and civilisation, rapidly shrinking back to the wilderness of barbarism and decay. National pride, the pride of race, is as strong among the Irish as in any race in the world, but national pride cannot exist with national squalor. The Irish are a very affectionate people, brave, imaginative, poetical, attached to their country, their homes, their families, their legends, their customs; they do not forsake all these ties without many a pang. Why, then, do they go? What do they seek? It cannot be a richer soil or more genial climate, for in these respects Ireland has no equal. It is not a life of idleness and ease, for in their new homes they have to work far harder than in their old. Why, then, do they go?

The answer is not difficult to find. They go to seek a healthier condition of life, a higher standard of existence; they fly from poverty and stagnation, from a land where there are no openings for success, no ray of hope, no industries, no trade, no exchange of commodities, no employment, no wages, to a land where all these conditions are reversed—where they can live and thrive, and perhaps grow rich; where they are no longer doomed to pass their lives hopelessly on the lowest rung of the industrial ladder—where, in fact, they are no longer the recipients of relief, but the donors of it. Whence comes this great ruin? What causes this great transformation scene? How is it that the Irish race, who steadily sink lower and lower in Ireland, rise with a bound to prosperity and civilisation in America, Canada, and Australia? What a man hears and reads constantly without contradiction he is apt to believe. Sale from poring so long over the Koran is said to have become a Mahomedan; so Englishmen, from hearing and reading so long, without contradiction, that over-population, high rents, and natural indolence are the causes of the poverty of Ireland, have at last assumed that it is true. Let us see. Natural indolence is not the cause. The Irish are a thrifty, money-saving people, and whenever they are well fed and well paid they will work as hard as, or harder than, any race in Europe. To charge the Irish with being idle is false. In our harvest fields or before our furnaces, or in the bowels of the earth, or in the loftiest buildings, no matter how dangerous the work, or how severe, there are seen the Irish. Precisely the same is seen across the Atlantic. Do not let us put the car before the horse. The indolence that we see in Ireland is not the cause of the misery in Ireland, it is the result of it. Men do not work because it is a pleasure to work, but because they are compelled to work, or because they are induced to work. The inducement of getting money or the compulsion of getting food are the ordinary stimulants to work, but the Irish have neither. A man has no inducement to work when what he produces does not fetch cost price. The Irish do not grow to sell, because what they grow costs more than it will fetch. They grow to live, and as in ordinary seasons they can grow enough to live by scratching the ground they are content to do that, and no more. High rents are not the cause of the decay of Ireland, because, independent of exceptional advantages of climate, soil, harbours, &c., she is lower rented than any country in Europe. Rent in Belgium is about 40s. per acre, in Holland it is somewhat higher, in France it is 56s. per acre, in England 30s., in Ireland 20s. It is not the slightest exaggeration to say that, as a rule, the cultivated land of Ireland is worth double or treble the land of Belgium, and yet the rent is only half as high.

We are told that over-population is the *mal du pays*—that it is the true cause of the poverty of Ireland. How can it be? How can there be a single man too many where land is uncultivated and industries unknown? If we had waste lands to bring into cultivation and industries to create, and had no population, what would necessarily be our first step? To import population. Now, we have the people and the waste lands; but, instead of bringing them together, instead of employing the people in cultivating the waste land and in creating industries, we export them—we drive them out of the country. We dissipate British capital in expatriating British subjects—in transferring the very bones and sinews of the Empire to distant climes, in order, forsooth, to increase our internal prosperity and strength. The great wealth of every country is its population. The first condition of making a country rich is to populate it. It is in Ireland alone that the strange doctrine has ever been preached that "it must be depopulated to be enriched." But Ireland is not over-populated; compared with many other countries it is quite the reverse. Fairly cultivated, and with her industries developed, she could easily support double her present population. The population of Belgium is 469 to the square mile; of England, 389; Ireland, 169.

The prosperity of Ireland has increased *pari passu* with the increase of population; the lower her population the greater has been her pauperism and misery. "The greatest and most fundamental defect of this kingdom," wrote Sir William Petty, in 1672, is the want of people. "The improvement of Ireland depends on the increase of the people," wrote Arthur Dobbs, in 1731. "Scarcity of people is the greatest want of this country at present," wrote Henry Lord Clarendon. Take fact. In 1725 the population of Ireland was 2,300,000, or 71 per square mile. In 1821 it was 6,801,827, or 211 per square mile. On an average of six years ending 1725, Ireland imported food to the value of 78,126£. On an average of six years ending 1825, Ireland exported food to the value of 2,366,163£. The value of cattle exported on an average of eight years ending 1726 was 623,177£. The value of cattle exported on an average of eight years ending 1825 was 3,705,993£. So that Ireland in 1821 not only grew sufficient food to feed three times the population that she did in 1725, but she exported over and above thirty times the value of grain and six times the value of cattle. Will anybody say after this that Ireland "must be depopulated to be enriched"? We subscribe money, the State supplies money, to convey our population to America, to our colonies, to Canada, Australia, New Zealand; but the best colonies we can plant, whether for agriculture or manufactures, are those which might be planted at home, in Ireland, in the deserts of the United Kingdom. "To force your population to emigrate," says Dean Swift, "because they are short of food, is like cutting off your foot because you are short of a shoe." Cultivate better, live closer; that is the way to increase the production of food, not by

cultivating less. Promote the industries of the people, develop your natural resources to the utmost; that is the way to grow rich.

Ireland has not always been miserable; she has not always been a by-word for poverty and decay. There was a time when she held her head high; when she sold to England her agricultural and her manufactured produce, her corn, her cattle, her woollens, and calicoes, and muslins, and silks, and cottons, and carpets, and blankets and flannels.

"Can those who now hear me deny," said Mr. Forster, speaking in the House of Commons in 1880, "that since the period of 1782, Ireland has risen in civilisation, in wealth, in manufactures, in a greater proportion, and with a more rapid progress than any other country of Europe?" Now, what put an end to this fair prospect? What has caused such a complete change that the reverse of what Mr. Forster described is now the fact; that "Ireland is now sinking in civilisation, in wealth, in manufactures in a greater proportion, and with a more rapid progress, than any other country in Europe?"

Up to the period of the Union Irish industries were strictly protected; on many articles of English manufacture, woollens, calicoes, muslins, silks, cottons, yarns, cotton twist, cotton manufactured goods, the duties were so high as to be nearly prohibitory; under the encouragement of this protection textile and other industries grew into maturity and vigour. The Act of Union continued these high protective duties on the woollens for 20 years, on calicoes and muslins till 1808; they were reduced gradually to 10 per cent. in 1816, and extinguished in 1821, with the exception of the linen trade, which was encouraged by Parliamentary grants up to 1826.

But English economists were not satisfied with denying to the Irish the right to protect their growing industries; they went further, they appeared determined to destroy them. For a long series of years Irish manufactures were systematically discouraged and slighted, whilst those of England and Scotland were at the same time protected or cherished. For many years England, Scotland, and the colonies were protected against Irish manufactures, whilst English and Scotch manufacture were admitted free into Ireland. Can economic injustice go further? Was not this tantamount to imposing compulsory idleness on Ireland! Was it not saying to her, "Thou shalt not work?"

Can we be surprised that, in 1727, Swift complains that, if under such conditions, Ireland did flourish, it must be against every law of Nature and reason, like the thorn of Glastonbury that blossoms in the midst of winter?

Now, what was the result of this legislation? Can there be any doubt? It is this—let our political economists explain it as best they can—that in 1840 there were, in Dublin and Cork, only one-tenth of the numbers employed in manufacturing industries that there were in 1800. In other words, 40 years of English economic rule had destroyed nine-tenths of the operative industries of Ireland.

There are fiscal laws that may create the wealth of a nation, and there are fiscal laws that may destroy it. Of which kind, may I ask, were the fiscal laws that in 40 years destroyed nine-tenths of the operative industries of Ireland? The great natural law of the preservation of the fittest has been fully exemplified; weekly Irish industries have given way before the stronger industries of England; but is Ireland any the better for it? Is England any the better for it? Is Ireland richer for the extinction of Irish industries? No! ten thousand times no! English competition has smothered Irish industries and supplies Irish wants; but Irish wants have dwindled to zero with her production. The means of satisfying her wants depended upon her means of making money, of creating wealth; but as she creates no wealth, as she makes no money, her wants must and do remain unsatisfied. When England bought Irish corn and Irish manufactures, Ireland bought English manufactures. Now that England has ceased to buy from Ireland, Ireland has ceased to buy from England; she neither produces nor buys—she does without. If Irish industries had been supported, encouraged, as it was the bounden duty of England to encourage and support them; if they had increased, as the industries of every nation under the sun have increased, wealth would have been created in Ireland; she would have money to spend, she would be a customer instead of a pensioner. At any cost of theories and first principles, so-called, England would be immensely profited by the industrial prosperity of Ireland.

SOUTH STAFFORDSHIRE INSTITUTE OF IRON AND STEEL WORKS MANAGERS.—At the last meeting of this society (Mr. M. Millard in the chair) Mr. J. E. Stead, F.C.S., of Middlesbrough, delivered an interesting lecture "On the Chemistry of Purifying Crude Pig Iron, and of the Puddling Process." The lecture was illustrated by chemical experiments and diagrams. It was purely technical, and from the frequent applause bestowed upon its points, extremely valuable. The Chairman moved a vote of thanks to the lecturer, and also moved that the paper should be printed. Mr. Rigby seconded the vote of thanks, and it was carried unanimously. The discussion on the paper was adjourned.

MODERN APPLICATIONS OF ELECTRICITY.—Taking for his subject, "Some Modern Applications of Electricity," an interesting lecture was delivered at the Mason College, Birmingham, on Jan. 21, by Prof. POYNTING, M.A., in which he remarked that 100 years ago electrical science was confined to the laboratory of the philosopher. Some few bolder spirits thought that they saw their way to practically apply it to convey signals to a distance, but the methods they would have had to employ were so clumsy it was impossible to carry it out then. It was only within the last 50 years that the telegraph had been employed to any extent, and electro-plating had been introduced even since then. But the science of electricity had made some rapid progress, and by "modern applications," he meant those which we saw coming into use every day, such as the dynamo-machine, which, though invented many years ago, was only now establishing itself; and the telephone, which had been invented in the last six or seven years. In dealing with the subject it was necessary to explain some of the terms which it was necessary to make use of. First of all, it was desirable to clearly understand what was meant by energy. Energy, when spoken of in connection with electricity, really meant power. Then there was the meaning of an electric current. By rubbing certain substances they obtained a new property, and the space surrounding them possessed energy or power, by virtue of which small bodies were attracted, and that energy or power was electrical. An electric current was the movement of this energy round, and into, conducting wires. If the wire was a simple ordinary one, the current entered the wire and became converted into heat. An electric current was a definite measurable thing, and electricians called the unit of current by which the measurement was effected, an ampere, so called from the name of a French electrician. The electrician showed that with the ampere as a basis, a current could be measured by making it act upon a magnet, and the amount by which the magnet was deflected showed how many amperes were passing through. Electro-motive force meant the electrical pressure at the two ends of the wire, and was measured by means of volts. There was a third property of resistance, as, for instance, platinum required a greater electrical pressure than silver, the resistance in the former case being stronger, and this resistance was measured by what was called an ohm. Having explained the various terms, the lecturer gave a number of interesting experiments with the dynamo-machine. Concluding with a description of the telephone, Prof. Poynting observed that, beginning with the Bell telephone, in which the speaker was made to do the work by the present time, there had been a great saving of human labour effected, for the voice was now merely the regulator of the natural force stored up in the battery.

EPPE'S COCOA—GRATEFUL AND COMFORTING.—"By a thorough knowledge of the natural laws which govern the operations of digestion and nutrition, and by a careful application of the fine properties of well-selected cocoa, Mr. Eppe has provided our breakfast tables with a delicately flavoured beverage which may save us many heavy doctors' bills. It is by the judicious use of such articles of diet that a constitution may be gradually built up until strong enough to resist every tendency to disease. Hundreds of subtle maladies are floating around us ready to attack wherever there is a weak point. We may escape many a fatal shaft by keeping ourselves well fortified with pure blood and a properly nourished frame."—Civil Service Gazette.—Made simply with boiling water or milk. Sold only in packets, labelled "JAMES EPPE and Co., Homeopathic Chemists, London."—Also makers of Eppe's Chocolate Essence.

FOREIGN MINING AND METALLURGY.

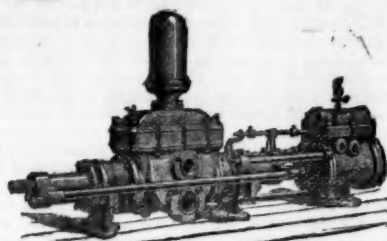
In the French Iron Trade the state of affairs is still far from brilliant. In the Nord wages has been reduced 10 per cent., and the number of working days is now not more than 18 or 20 per month—a fact which affords a forcible illustration of the general scarcity of orders. One forge in the Nord is stated to have accepted 6l. 2s. for its iron. Fresh contracts for rails have been taken at relatively low rates by some of the French works. The Steelworks Company of France, for instance, has taken a contract from the Orleans Railway Company for 720 tons of steel rails at 6l. 18s. 9d. per ton delivered at Gisors. The Eastern of France Railway Company has sold 3000 tons of steel rails at 3l. 15s. 2d. per ton. The same company has let a contract for 200 locomotive axles to the John Cockerill Company. The condition of the German iron trade has remained generally unchanged, although some firms have made strenuous efforts to advance their rates. The German ironmasters have had a meeting, at which they decided to maintain the price of iron at 6l. per ton, and to reduce their production with this object; after all, however, the maintenance of quotations is, of course, dependent upon the general tone of business. Plates have been in a little more demand in Germany than other metallurgical products; the demand for iron wire has been languid in consequence of a decline in the demand on American account. The German steelworks are still well employed. The exports of rails from Germany in the first eleven months of last year amounted to 159,992 tons; those of plates were 48,838 tons.

The intelligence received with respect to the state of affairs in the Belgian iron trade is not very reassuring. The demand does not increase; it appears, indeed, after having experienced a slight revival, to have become as dull as ever. Quotations remain depressed, and it is difficult to give them with any precision as to secure business immediately concessions of more or less importance would be made. English pig has remained at 2l. 2s. 6d. per ton upon the Belgian markets. Belgian refining pig has been weak at 2l. 2s. per ton in consequence of the heavy stocks held; ordinary pig has declined to 1l. 18s. per ton, and mixed pig to 1l. 14s. per ton. No. 1 iron has been quoted at 4l. 16s. per ton; No. 2 at 5l. 2s. per ton; and No. 3 at 7l. 4s. per ton. Plates of commerce have made 8l. 16s. per ton. To stimulate business, however, it appears to be thought that some reduction in quotations will have to be made. A contract is about to be let in Belgium for 11 bridges for weighing trucks on the Belgian State Railways. The Italian Admiralty has decided upon building a transport of large dimensions. The Italian naval administration has further decided that the transport should be entirely a product of Italian industry. The engines are to be of 6000-horse power, and tenders have been invited from seven leading Italian firms. It appears that in the first half of this year the Italian Government and sundry Italian provinces propose to devote 1,159,404l. in aid of the work of Italian railway construction and equipment.

The slackening in affairs which generally follows the close of the winter begins to be felt in the Belgian coal trade. Deliveries have fallen off, and on various sides there are complaints that stocks are assuming an unsatisfactory importance. As the demand for household coal has rather materially declined while the proprietors of industrial establishments are only laying in reduced supplies, it is natural that the situation should occasion some complaints to be made. In the Liège basin business has hitherto been well maintained; but even in this district there are complaints of an accumulation of stocks, especially at Seraing and in the surrounding district, so that a suspension of working operations on Mondays is becoming general, although no official reduction has been made at present in quotations. In the Couchant de Mons the situation is relatively more favourable. The imports of English coal at Genoa last year are returned at 869,095 tons, as compared with 717,386 tons in 1882. The intelligence forthcoming with regard to the German coal trade is generally favourable, although some branches of it appear to be in a somewhat depressed and suffering condition. Household coal, for instance, is neglected, and coke remains dull and depressed. The production has become too heavy, and it has been deemed necessary to blow out some furnaces in consequence. In Westphalia alone 300 furnaces have been blown out during the last few days. The exportation of German coal is still proceeding, however, upon a considerable scale, and this fact has been of material service of late to German colliery owners.

OVERHEAD TELEPHONE WIRES.—The enormous increase of overhead wires for the conveyance of electricity, whether for telegraphic or telephonic purposes has naturally caused considerable dissatisfaction and alarm with regard to their unsightliness and danger; whilst the fact that the New York authorities have condemned the overhead system, and ordered that all overhead wires be removed by a certain date, has somewhat frightened the telephone companies, which now propose a still greater nuisance of telephone posts in the public streets. At an extraordinary meeting of the United Telephone Company on Jan. 22, the Chairman (Mr. James Brand) stated that they had found the difficulties of carrying on their business with overhead wires growing, he might say, constantly, and they had therefore felt that the best way would be to face the matter at once, and go to Parliament for a bill which would put the laying of wires under some properly constituted authority. They had no wish to ride rough shod over other people's property or rights; but the want they supplied had now become a necessity all over the world, and they desired to get proper authority to lay their wires with a minimum of danger to the public, if any existed, and to meet the cry which had been raised in some parts of the disfigurement of the streets by their cross spans and long spans. With regard to the risk of danger to the public by overhead wires, they believed it had been greatly exaggerated. In the four or five years in which the company had been in existence they had paid less than 50l. for every kind of damage they had caused. The directors of course knew that communication could take place, and very satisfactorily in certain circumstances, by underground wires, but it was not established at all satisfactorily that underground was as good as overhead communication for telephone purposes. Besides this they had not the power to go underground, and if they had, all the main and even the secondary thoroughfares of the city were occupied with gas and water pipes, pneumatic tubes, telegraph wires, sewers, &c.; and the inconvenience caused by another company breaking up the streets would certainly be very great. The expense, too, would be enormous. He quite admitted that there should be some public authority with an effective voice on the question of overhead wires. The company, however, had anticipated the view of Sir Arthur Hobhouse by promoting their bill. He concluded by moving a resolution approving the bill, "subject to such additions, alterations, and variations as Parliament may think fit to make therein." Mr. J. S. Forbes, in seconding the motion, expressed his belief that when their bill was before a Parliamentary committee they would be in a position, with the aid of counsel and science, to dissipate all the fears which seemed to be entertained as to overhead wires. If the public were to have the telephone they must have it on conditions on which it was possible to have it; and one of the conditions seemed to be overhead wires. The solicitor (Mr. Winterbotham) then read the heads of the bill, clause 6 of which provided that the company might place and maintain a telephone wire under or over any street, and place and maintain posts in or upon any street, and alter or remove the same; open any street, and alter the position of any pipe (not being a main) for the supply of water or gas; and place and maintain a telephone wire and posts under, in, upon, over, along, or across any land or building, or any railway or canal, and alter or remove the same. Provision was made for the company giving compensation for any damage, and clauses were also contained in the bill by which the company would not have the power to place telephone wires under any street without the consent of the local authorities, and providing that notice was to be given to the local authority before breaking up any street. Further clauses provided for the height of wires over houses, as to placing posts near dwelling houses, for removing works of the company in the event of their interfering with building or other purposes, the inspection of wires by the Board of Trade, and the enforcement of rules by the Board of Trade for preventing danger from the company's works. The resolution was carried unanimously.

PUMPS FOR MINING USE.



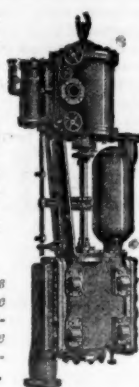
HORIZONTAL DOUBLE PLUNGER PUMP
Suitable for Gritty Water.



The illustration on the left represents a Vertical Pump for sinking work. It occupies a very small amount of floor space, and the plungers are suitable for dealing with gritty water.

The illustration on the left shows a Vertical Piston Pump, for use in sinking, &c., where the water is clean.

In both these Pumps the up and down stroke can be controlled separately, and both the slide valves are of the ordinary flat construction.



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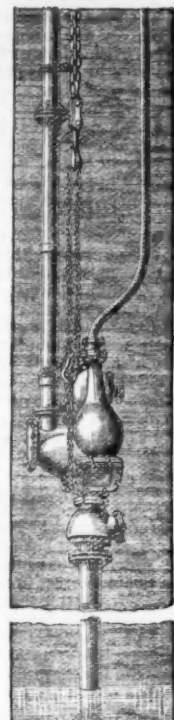
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PATENT STEAM PUMP,

WILL PUMP ALMOST ANYTHING.
NEEDS NO SKILLED ATTENTION.
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NO OILING, LEATHERS, OR PACKING.

THE DEANE DIRECT ACTING PUMP, for High Lifts and Heavy Pressures. Very simple and reliable. First-class material and workmanship. Made in a great variety of patterns and sizes to suit various requirements.

The illustration on the right represents a Pulsometer suspended in a shaft.



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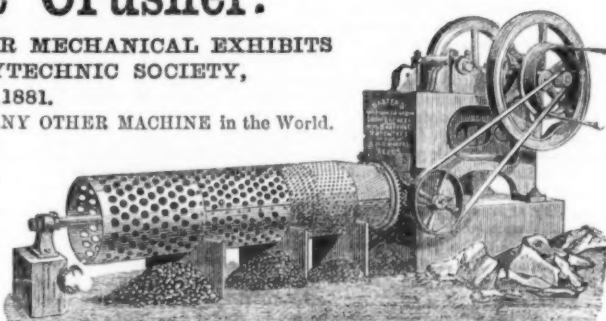
The Only Knapping Motion Stone Breaker and Ore Crusher.

AWARDED THE ONLY SILVER MEDAL FOR MECHANICAL EXHIBITS
AT THE ROYAL CORNWALL POLYTECHNIC SOCIETY,
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GUARANTEED to do MORE WORK with less power THAN ANY OTHER MACHINE in the World.
NOTE THIS FACT.

To Mr. Baxter, Leeds. *Cinderford, Feb. 13, 1883.*
DEAR SIR,—I am pleased to be able to tell you that the Machine works splendidly. We are breaking 16 trucks a day now, and we thought it a good day's work to do 10 a day with the old Machine, so you can see the difference. I had a gentleman looking at it yesterday, and he was surprised to see it work so easily.
Yours truly, E. ORGAN.

The above refers to one of our 16 by 9 Machines we supplied to replace an "Improved Blake" 15 by 9 Machine.



GUARANTEED NO INFRINGEMENT OF ANY OTHER PATENT

AWARDED THE ROYAL MANCHESTER, LIVERPOOL, AND NORTH LANCASHIRE AGRICULTURAL SOCIETY'S SILVER MEDAL,
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SILVER MEDAL (HIGHEST AWARD) MELBOURNE, 1881.

JOHN SPENCER,

Globe Tube Works, WEDNESBURY,

AND 3, QUEEN STREET PLACE, CANNON STREET, LONDON, E.C.

FIRST PRIZE, SYDNEY, 1880.
TUBES AND FITTINGS for Gas, Steam, and Water; Galvanised, Enamelled, and Hydraulic Tubes; Boiler Tubes and Fittings; Gas Fitters' Tools; Brass Cocks, &c.
ANTI-CORROSION TUBES AND FITTINGS COATED BY BARFF'S RUSTLESS PROCESS.

TUBES

ASBESTOS, AND ITS APPLICATION.

The greatly extended application of asbestos in various industries has given rise to some scarcely justifiable assertions concerning the relative superiority of the products of various districts; but practical experience has proved that where proper care is exercised in the manufacture best quality goods can be produced with raw material from various sources. Asbestos, as its name indicates, is practically "indestructible;" it is a fibrous mineral made up of fine flexible silky filaments, which can be readily pulled apart, and consists chiefly of silica, magnesia, and alumina. Unless in exceptional cases it appears to be the chemical composition and flexibility of the fibre rather than the length of fibre, which determines the value of asbestos, and it is probably owing to misconception on the part of the public that the superior merits of the Canadian mineral have not been before this more generally recognised. It was mentioned in the *Mining Journal* of Jan. 19 that Mr. John Bell, of Southwark-street, had published a new illustrated catalogue and the analyses of two samples of asbestos—one of best quality brown Italian, the other of white Canadian, now extensively used in the manufacture of asbestos yarn cloth and millboard—throw much light upon the subject. The Italian sample gave—magnesia, 40.18; protoxide of iron, 0.75; alumina, 2.82; silica, 40.25; water of hydration, 14.20; soda, 1.37; potash, protoxide of manganese, and lime, traces; chlorine, 0.15; sulphuric acid, 0.31 = 100.03. The Canadian sample gave—magnesia, 33.21; protoxide of iron, 5.77; alumina, 6.69; silica, 40.92; water of hydration, 12.20; soda, 0.88; potash, protoxide of manganese, and lime, traces; chlorine, 0.22; sulphuric acid, traces = 99.69. Now, in this particular case the advantage would appear to be decidedly with the Canadian material, since the Italian is poor in alumina and has 2 per cent. more water; it has also an appreciable percentage of sulphuric acid, of which the Canadian sample shows mere traces; but Mr. Bell is, no doubt, correct in remarking that to say that asbestos from one country is better than that obtained from another is as unreasonable as to maintain that New Orleans cotton should be used to the exclusion of all others. The right application of asbestos fibre in manufacture, like everything else, depends on knowledge and skill, and it is the business of the maker of asbestos goods to know whether Italian or Canadian fibre is the most suitable for the purpose he has in view. In the manufacture of Bell's asbestos goods both Italian and Canadian fibre are used, according to their special adaptation to the purpose for which the several classes of goods are made. Much disappointment has been experienced by those who have used asbestos in the purchase of which attention has been paid to price rather than quality, and such will continue to be the case as long as steam users buy without true discrimination.

The applications of asbestos are constantly increasing, and the catalogue now under consideration affords abundant evidence that Mr. Bell has given the subject considerable attention. He says that asbestos millboard is now universally recognised as one of the best and most economical materials for dry steam joints. It has, however, been found that the soluble salts contained, to a certain extent, in all asbestos have a tendency to corrode iron. The indiscriminate use of asbestos fibre in the manufacture of millboard has produced many cases of injury to joint faces, and bolts have been eaten away. Hitherto, careful selection of the fibre has been relied on to preserve the users of Bell's asbestos millboard from the mischief referred to, and no case of injury to machinery by this carefully made material has been reported. The subject is, however, of the greatest importance, and the result of an exhaustive series of experiments is the discovery of the cause of the mischief and a system for its perfect removal. The process is patented, and he has the exclusive right to use it. A somewhat similar form of the material is the asbestos flooring felt. It is mentioned that this article is manufactured from specially prepared asbestos fibre, and by its use any building can be rendered comparatively fire-proof at a very small cost. This material should be used as a substitute for brown paper under the carpet, and it can be taken up and re-laid as often as required; it may be laid between the flooring boards, on the ceiling before plastering, and on the walls. Asbestos felt, being a non-conductor of heat, is superior to any other sheathing, and used under slates has no equal. It yields no dust, lies quite flat, is soft to the tread, and its low cost places it within the reach of everybody. The utility of asbestos paint in resisting fire has already been referred to in the *Mining Journal*, and an equally valuable application of the material is in the form of asbestos cordage. For fire escapes—for it should be mentioned that it has great tensile strength—it would, no doubt, be of incalculable value, and it is also claimed that it is the best material for heavy window sashes, because it is unaffected by heat or damp, and renders unnecessary the use of metallic cord, wire, and chains. For making the hot air pipe joints in blast-furnaces it is the most efficient material known. These joints are formed of an iron ring with round section. The cordage is wrapped diagonally round the ring, and the joint thus made. The asbestos cordage frequently lasts six months, whereas the materials previously in use had to be renewed daily.

But, perhaps, the most interesting application of asbestos is in connection with the economisation of steam. A special fine spun asbestos yarn engine packing is made by Mr. Bell, in which pure asbestos yarn is plaited by machinery into a steam tight rope, forming without a cotton covering the most efficient and durable engine packing ever produced. The fibre is opened from the crude state, and prepared for the yarn by a mechanical process not practised by any other house, and is rendered so perfectly free from impurities, that the rope, whilst possessing great strength and compactness, is as soft and flexible as silk, does not score the rod, and has proved satisfactory even in most difficult cases. No acids or chemicals of any kind are used in the preparation of the fibre. The plaited asbestos rope is so much lighter than all other packings that it is the cheapest packing in the market. For locomotives and all stationary engines running at a very high speed with intense friction he makes a packing composed of asbestos yarn plaited with an intermingling of very fine and pure soapstone, which keeps the packing elastic. Numerous trials under various conditions have proved this packing to be the best form of making up asbestos as a locomotive packing. It is also a very reliable packing to be sent to places where only inferior skill can be obtained for the management of the engine. The hygroscopic nature of asbestos millboard has from the first been recognised as its weak point, and engineers have found it necessary to discard its use where the joint is much exposed to moisture; in such cases india-rubber sheeting has hitherto been largely used, but the liability of this material to injury by heat renders it objectionable. What is wanted is a material that resists both heat and moisture, and this points to the necessity for an intelligent combination of asbestos and india-rubber, which Mr. Bell seems to have made, and he claims that whatever may be the circumstances requiring a joining material capable of offering efficient resistance, where all other materials have failed, this article will be found to furnish absolute security. For special engineering purposes, such as re-packing steam cocks, chemical pumps, &c., Italian fibre of the finest quality, carded and combed by means of special machinery erected for this purpose, is strongly recommended. No chemicals of any kind are used in the preparation of this fibre.

With regard to the use of asbestos as a covering for steam pipes, with a view to prevent the radiation and ensure the transmission of heat, Mr. Bell remarks that various methods have been tried for the application of asbestos as a protection of non-conducting materials used as covering for steam pipes, but these have all been defective in the form adopted for the asbestos, and in consequence of the extra expense and difficulty in dealing with sharp elbows and curves. The mode of combining asbestos and hair felt now proposed is the simplest, most convenient, and economical preventive of radiation from heated surfaces ever attained. A flexible asbestos millboard, specially prepared so as not to tear, is wrapped diagonally round the pipe, and this effectually protects the hair felting from the most intense heat. Over the asbestos is placed hair felting, and the whole is enclosed in oil-cloth. A large saving of fuel is effected by this covering, and in consequence of the reduction of condensation cry steam can be carried for use at a considerable distance from the boiler and used effectively. Asbestos non-conducting boiler and steam pipe covering composition is claimed to be a perfectly effective and

very economical coating for every class of steam pipes and boilers. It is non-combustible, and easily applied when steam is up, adheres to metals and preserves them from rust, prevents the unequal expansion and contraction of boilers exposed to the weather, covers 50 per cent. more surface than any other coating, and is absolutely indestructible. It can be stripped off after many years' use, mixed up with 20 per cent. of fresh and applied again. Asbestos is also applied as a preservative boiler mixture, which by absorbing the free oxygen that is in the water entirely checks pitting and corrosion. It also disintegrates incrustation so immediately as to prevent its adhering to the plates. Not only is a great economy of fuel effected by keeping boilers clean, but the risk of having the plates burned is thereby obviated. It has been computed that 1-16 in. thick of incrustation causes a waste of 15 per cent. of coal; $\frac{1}{4}$ in. 60 per cent.; and $\frac{1}{2}$ in. 150 per cent. Thus the preservative avoids the great risks which are inseparable from scaled plates, lengthens the life of a boiler, and covers its own cost manyfold by economy of fuel. These are some of the purposes to which Mr. Bell has applied asbestos, and many other applications are mentioned, but one more only can be here noticed—his patent asbestos expansion sheeting. It is another combination of asbestos with india-rubber, giving to the steam user the special advantages of both materials. The india-rubber washer is protected from the action of heat and grease by an outer coating of vulcanised asbestos cloth, thus producing an excellent joint where expansion and contraction render other materials unserviceable.

This material is claimed to be admirably suited to steam pipe joints and every class of valve. Valves made of this material are found to be very durable, as they are not subject to injury by oil.

COLLIERY MANAGERS' ALMANAC.—The edition of this useful and handsome sheet almanac for 1884, which has just been issued, is in every respect equal to its predecessor. The directory of leading manufacturers appears to have been considerably extended. The information given is precisely such as is likely to be required by the class for whom it is compiled, and will not fail to be largely patronised by them.

CASSIDY'S PUBLICATIONS.—Archdeacon Farrar's Life and Work of St. Paul, part 25, contains the continuation of the chapter Gnosticism in the Gern, and the chapters on the Epistle to the Colossians, and the Epistle to Philemon. Knight's Practical Dictionary of Mechanics, part 86, extends from Wale to Wedge-press.

HOLLOWAY'S PILLS AND OINTMENT.—During piercing winds and excessive variations of temperature every one is more or less liable to internal congestions and inflammations. Throat, chest, liver, bowels, kidneys, all suffer in some degree, and may be relieved by rubbing in this ointment, aided by proper doses of the pills, for administering which full directions accompany each box; in truth, any one who thoroughly masters Holloway's "Instructions" will, in remedying the disease, exchange the labour of an hour for the profit of a lifetime. All bronchial, pulmonary, and throat disorders require that the ointment should be thoroughly well rubbed upon the skin twice a day with great regularity, considerable briskness, and much persistence.

FRANCIS & JENKINS,

GREENFIELD WORKS, LLANELLY, SOUTH WALES.

Manufacturers of Steel-pointed Spades and Shovels, Draining and Grafting Tools, &c. Also Manufacturers of

COPPER WORKS LADLES,

To which special attention is given. Rabble Heads, Paddles, and every description of Light Hammered Work.

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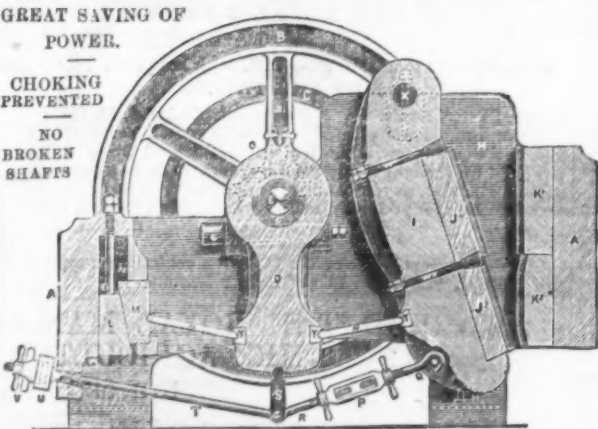
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No implements required for opening inner tin box, thereby avoiding any danger arising from opening same with tools, as generally used.

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GREAT SAVING OF
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PREVENTEDNO
BROKEN
SHAFTSPATENTEES AND SOLE MAKERS
OF THEIR WELL-KNOWNPatent Improved
Blake Stonebreakers
and Ore Crushers,
With PATENT DRAW-BACK MOTION,
WHICH DISPENSES WITH ALL SPRINGS.
JAWS adaptable either for CUBING or CRUSHING.
Reversible in Four Sections, with Surfaced Backs.
Steel Toggle Cushions.PRICES, PARTICULARS, AND TESTIMONIALS ON
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THE NEW PATENT FLAX BELTING.

The Only Good Belt made of Textile Fabric.—Manufactured solely from the best Russian Flax.

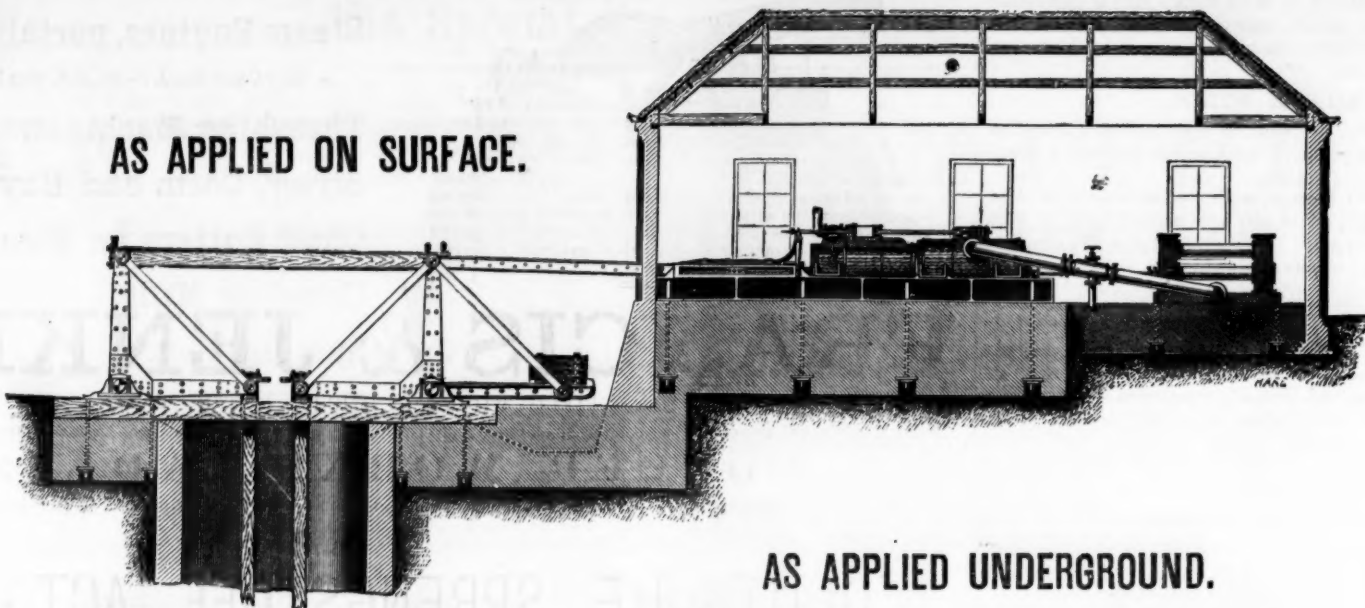
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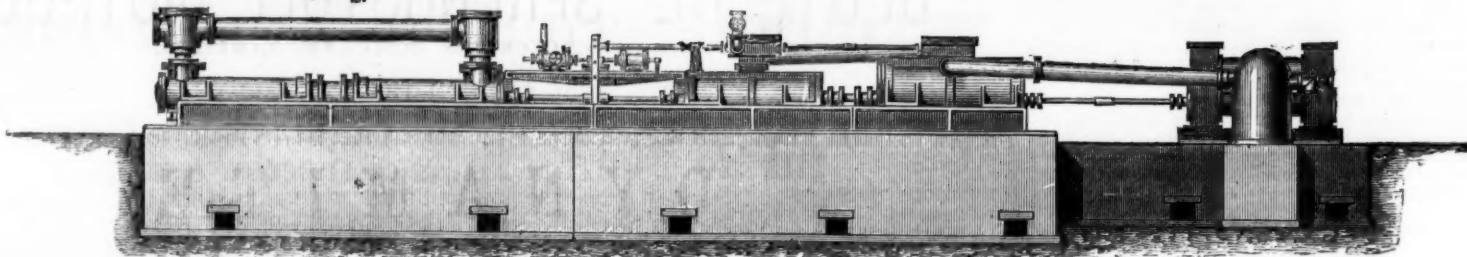
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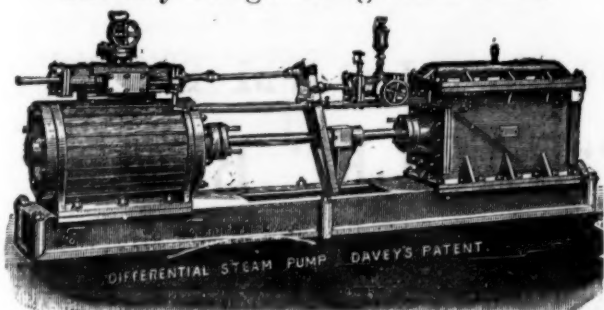
MINING MACHINERY OF ALL KINDS.

Hydraulic Pumping Engines and Hydraulic Machinery of all kinds.

THE DIFFERENTIAL STEAM PUMP.

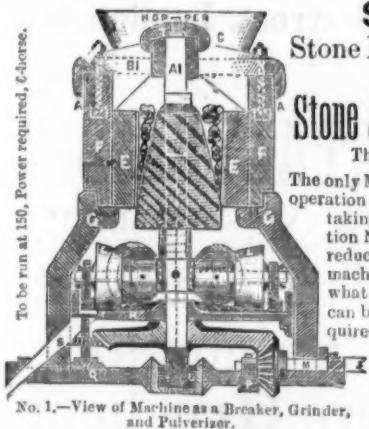
The only Self-governing Steam Pump

PRICE LIST.



See Reduced Price List.

Diameter of Steam Cylinder. Inches.	Diameter of Water Cylinder. Inches.	Length of stroke. Inches.	Gallons per Hour.	Height to which water can be raised with 40 lbs. steam pressure. Feet.	PRICE. £	Price with Condenser, in Suction Pipe. £	Price with Air Pump Condenser. £	Diameter of Suction and Delivery Pipes. Inches.	Diameter of Steam Pipe. Inches.	Diameter of Exhaust Pipe. Inches.
10	5	15	5,200	250	65	72	85	53½	1½	2½
10	7	15	10,400	130	70	80	100	6	1½	2½
10	9	15	17,300	70	85	100	120	4½	1½	2½
12	6	24	6,500	250	90	104	130	5½	2	2½
12	7	24	10,500	180	96	110	136	6	2	2½
12	8	24	13,500	140	100	114	142	7	2	2½
12	10	24	21,300	90	120	136	175	5½	2	2½
14	7	24	10,400	250	110	130	156	6½	2½	3
14	8	24	13,500	190	120	145	165	6	2½	3
14	9	24	17,300	150	130	150	172	7½	2½	3
14	10	24	21,300	120	140	162	190	9	2½	3
14	12	24	30,800	80	160	190	216	6	3	3½
16	8	24	13,700	250	140	170	195	6½	3	3½
16	9	24	17,300	200	150	180	215	7½	3	3½
16	10	24	21,300	160	160	196	225	7½	3	3½
16	12	24	30,800	110	180	220	246	9	3	3½
16	14	24	42,000	80	200	242	264	10½	3	3½



No. 1.—View of Machine as a Breaker, Grinder, and Pulverizer.

S. MASON & CO.,
Stone Machine Works, Leicester, England.

NEW PATENT CIRCULAR

Stone & Ore Breaker, Grinder & Pulverizer

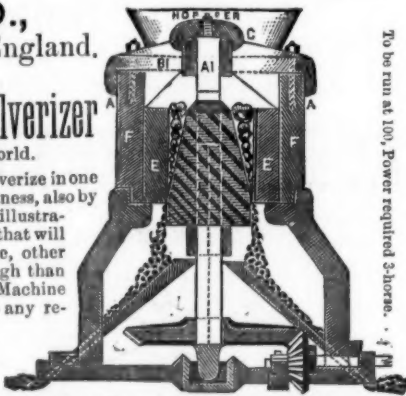
The Simplest and Strongest Machine in the World.

The only Machine made that will Break, Grind, and Pulverize in one operation either wet or dry mineral to any degree of fineness, also by taking away the rollers it will break to any size (see illustration No. 2.) This is the only machine in the world that will reduce all that is put into it to the required size, other machines open and shut, so let larger sizes through than what is wanted, besides mixing them together. A Machine can be seen at the Works in motion, breaking up any required mineral.

READ THIS—

Lord Donnington's Works, Cloud Hill,
Near Ashby-de-la-Zouch, Nov. 29, 1883.
Gentlemen,—The Breaker, Grinder, and Pulverizer is working well, and giving satisfaction.

Yours truly,
J. W. STABLEFORD, Manager.



No. 2.—View of Machine as a Breaker for different sizes.

AND THIS—

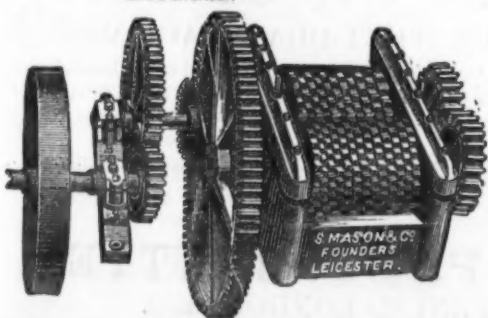
To Messrs. S. Mason and Co.,
Dear Sirs,—The six Stone Breaking Machines you have supplied to us are doing their work well and giving every satisfaction. Our stone being so hard, we have broken several Machines that we had bought from other firms, but the Machines purchased from you are strong enough to meet our requirements.

Yours truly, S. D. POCHIN, Croft Quarries, near Hinckley.

AND THIS—

The Tees Scoria Company, Acklam Furnaces,
Middlesborough, Nov. 23, 1883.

Gentlemen,—The 12 x 7 Stone Breaker you supplied us with in August, 1882, is working first class. We should think it has the most severe test (continually) to which any Stone Breaker is subjected to. We are pleased to inform you that our customers, who are chiefly Surveyors, speak highly of it.—Yours truly, T. W. FENT, Secretary.
Messrs. S. Mason and Co.



S. M. & Co.'s Roller Mill for Stone, Ore, Bones, &c. The teeth are made harder than steel, and slide on a cylinder, so are easy renewed when required, and are made to suit any material.

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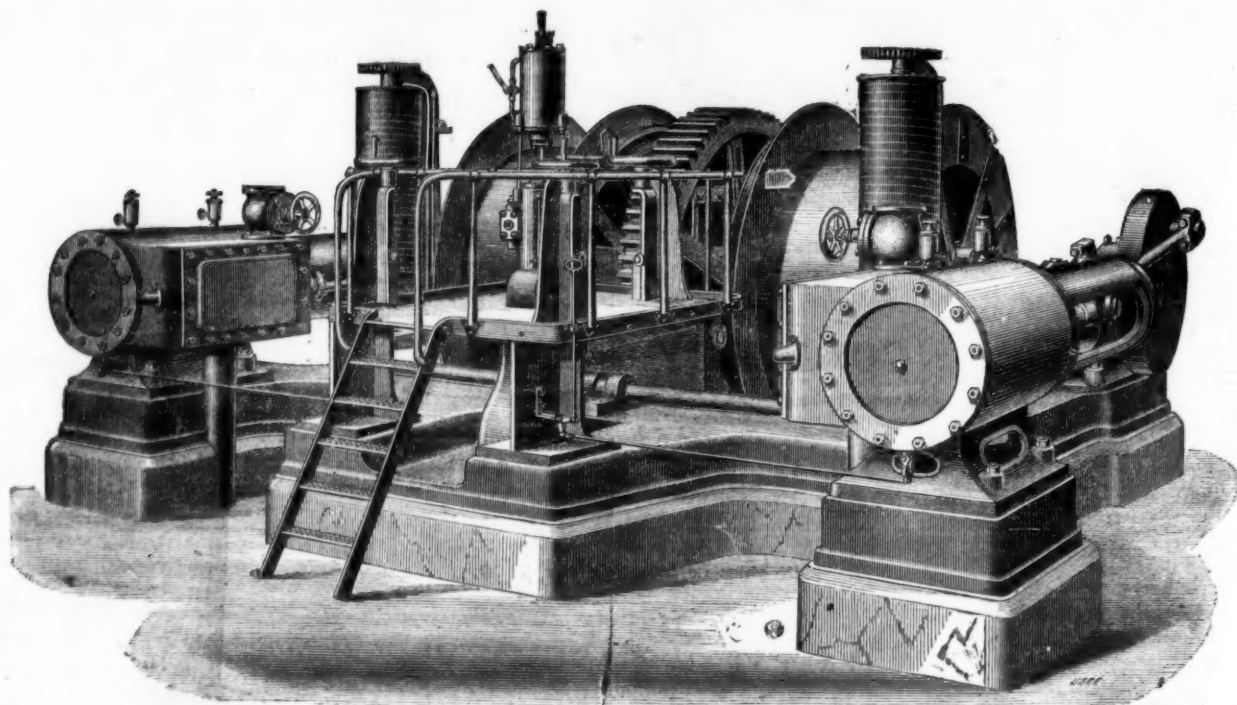
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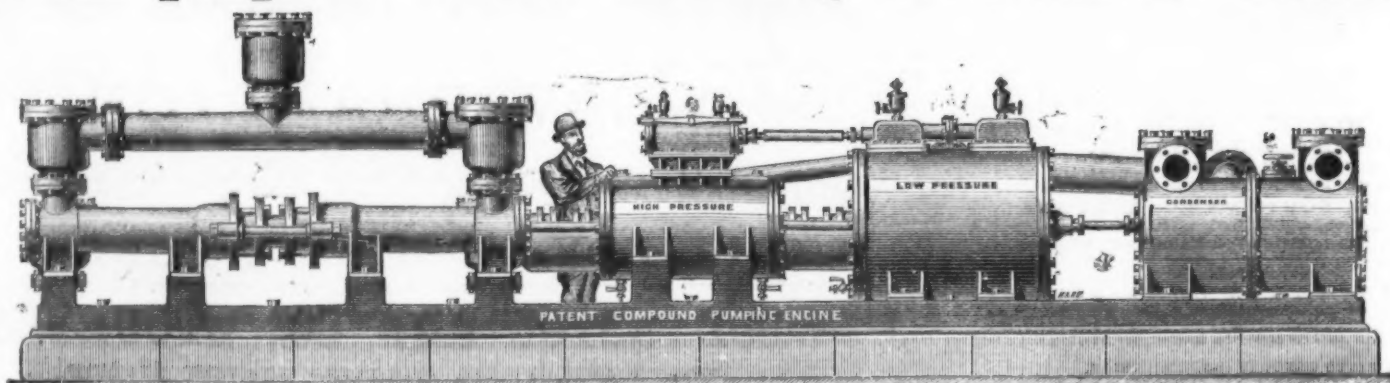
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CATALOGUES FORWARDED ON APPLICATION.

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RENEWABLE TOGGLE CUSHIONS, &c.**OVER 4000 IN USE.**EXTRACTS FROM TESTIMONIALS.
PULVERIZER.

"I have great pleasure in bearing testimony to the merits and capabilities of your patent combined fine crusher and sieving apparatus. I have tried it on a variety of ores and minerals, and it pulverizes them with equal success. You can put in a small paving stone and bring it out like flour."

"In reply to your favour, I have much pleasure in informing you that the 12x3 Pulverizer we had from you is giving us every satisfaction. The material we are operating on is an exceptionally hard one. I am well satisfied with its working."

"Our experience is that the motion and mechanical arrangements of your machine are the best for pulverizing that we have ever met with."

"The reports from our mines as regards the working of your Fine Crusher (20x5) recently supplied are very favourable, although we cannot quote you exact figures. On being got into position it was tried by hand, with the result that it made short work of the biggest pieces of ore we put into the hopper. You might say how long you would take to deliver another of the same size."

"As I once before stated, your machine is a perfect pulverizer."

"I am sure the machine will be a success, and a great one, and there is any amount of demand for such a machine. We can work it with 20 lbs. of steam, and our engine, which is a 12-h.p., plays with the work, in fact we run the Stonebreaker and the Pulverizer both together with 35 lbs."

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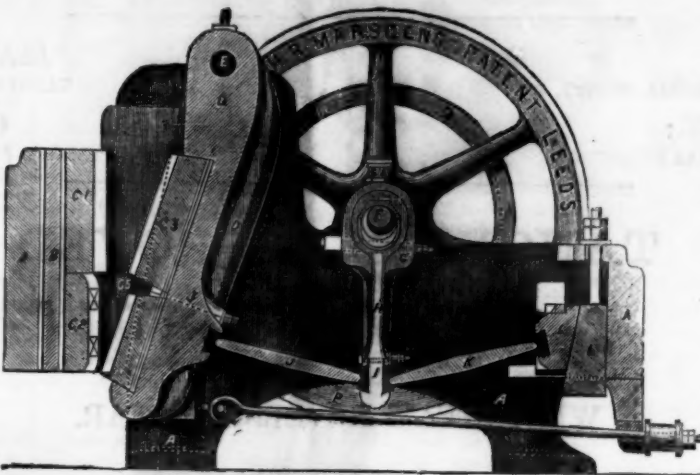
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"Some of your testimonials do not give your machines half their due. I have seen men hammering away on a big rock for a quarter of a day which your machine would reduce to the required size in a quarter of a minute. I would guarantee that your largest size machine would reduce more of the Cornish tin caps (which is the hardest rock of England) in a day than 200 men, and at 1-25th the cost."



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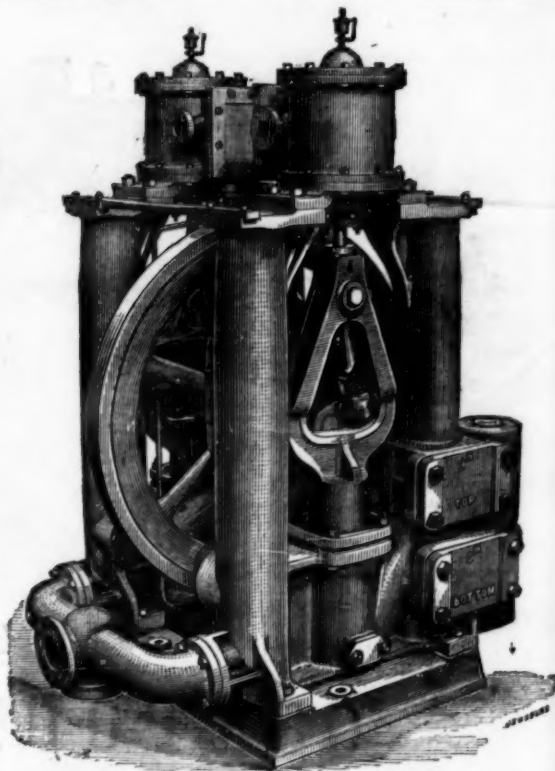
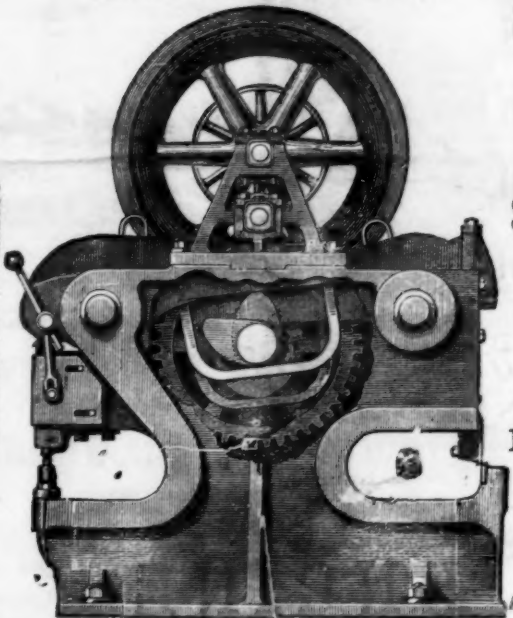
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